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ABSTRACT

This report presents results from the first cycle of the Program for International Student Assessment (PISA). PISA is a new international assessment of 15-year-olds in reading, mathematics, and science literacy. The United States has joined with 27 other member countries of the Organization for Economic Cooperation and Development (OECD) and 4 non-OECD countries to assess their students performance against international benchmarks through PISA. PISA content is not drawn strictly from school curricula, but rather from a framework agreed to nationally on what reading, mathematics, and science literacy mean. After the year 2000, PISA results are scheduled to be available every 3 years so that progress for each of the subjects can be tracked over time. As a first step toward measurement of cross-curricular competencies, in PISA 2000, student questionnaires sought information about student attitudes toward reading and learning strategies. This information, in conjunction with achievement data, provide baseline information for later PISA studies. Four appendixes contain technical notes, descriptions of the international studies in subject areas, supporting statistical data, and the released items from the PISA 2000 assessments. (Contains 38 tables, 26 figures, and 41 references.) (SLD)

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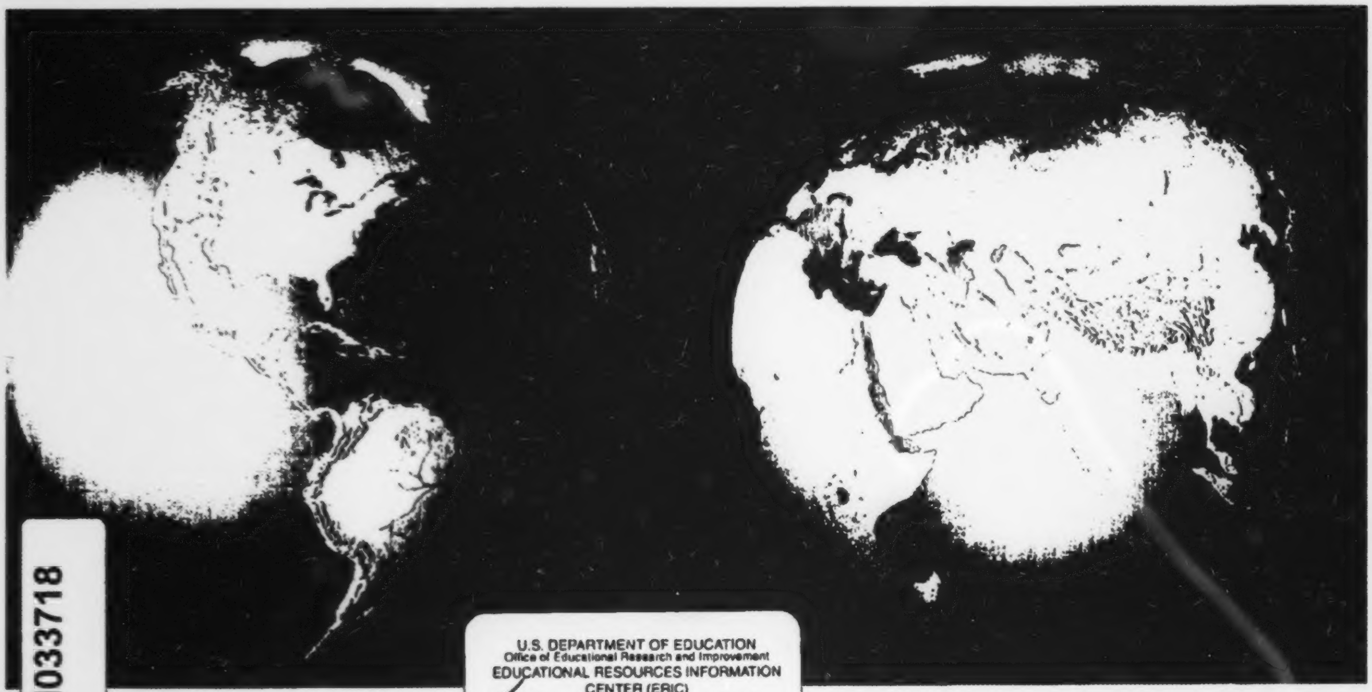
NATIONAL CENTER FOR EDUCATION STATISTICS
Statistical Analysis Report
December 2001

OUTCOMES OF LEARNING

Results From the 2000 Program for International Student Assessment of 15-Year-Olds in Reading, Mathematics, and Science Literacy



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OUTCOMES OF LEARNING

Results From the 2000 Program for International Student Assessment of 15-Year-Olds in Reading, Mathematics, and Science Literacy

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COMMISSIONER'S STATEMENT

The Program for International Student Assessment is a new international assessment of 15-year-olds in reading, mathematics, and science literacy. We know that assessments serve many different purposes. At the classroom level, assessments help teachers determine how individual students are doing and what topics may need additional instruction. At the state and national level, they help administrators understand overall patterns of student performance within states and across the nation. Similarly, at the international level, assessments like PISA help policymakers, researchers, and the public understand how the performance of their students compares to that of peers in other countries.

NCES has long participated in both national and international assessments in order to fulfill its mission of reporting on the "condition of education in the United States and other nations." PISA adds another facet to NCES' collection of information. The United States joined with 27 other member countries of the Organization for Economic Cooperation and Development (OECD) and 4 non-OECD countries to assess their students' performance against international benchmarks through PISA. This OECD-sponsored assessment will provide for a regular cycle of information to compare trends over time and across nations.

PISA is built on a different framework from other national and international studies. It aims to advance understanding of how well equipped young people are for their future lives, by emphasizing items that have a real-world context. PISA content is not drawn strictly from school curricula, but rather from a framework agreed to internationally on what reading, mathematics, and science literacy mean.

Consider the possible experiences of 15-year-olds who took the PISA assessment in the United States in the year 2000. Most of them will have been in school for more than 10 years. Some will have attended public school, some private school. Some will have come from literacy rich home environments. Some will have taken advanced courses, some will have gone on field trips, and some will have used computers in their classrooms. In addition to school, some will have attended camp, had summer or part-time jobs, cared for younger siblings, or participated in sports teams, competitions, or any number of other kinds of activities. All of these experiences may be associated with their performance on PISA. The title of this report, *Outcomes of Learning*, reflects PISA's emphasis on describing performance based on the school and non-school learning experiences 15-year-olds may have had.

The results presented in this report represent only the first cycle of PISA. After 2000, PISA's results are scheduled to be available every 3 years, so that progress for each of the three subjects can be tracked over time. Future cycles of PISA will also further address new areas of assessment, such as problem solving and the use of information and communications technologies.

We here at NCES hope that the information in this report, and what will be available from future phases of PISA, will be of use to all readers—those from the education community, the business community, and the general public—who have an interest in understanding the performance of America's 15-year-olds in reading, mathematics, and science literacy.

Gary W. Phillips

Gary W. Phillips
Deputy Commissioner

December 2001

TABLE OF CONTENTS

Acknowledgments iii

Commissioner's Statement v

List of Tables ix

List of Figures xii

Chapter 1: PISA—The Program for International Student Assessment
- PISA in Brief 2
- PISA's Yield Measure of Learning 4
- The Unique Contribution of PISA 4
- Report Summary and Organization 6

Chapter 2: Reading Literacy
- Key Findings 7
- Defining Reading Literacy 8
- Specific Skill Areas in Reading Literacy 8
- Reading Literacy in PISA Countries 9
- The Distribution of Reading Literacy 10
  - *National Percentiles* 10
  - *International Percentiles* 12
  - *Levels of Proficiency in Reading Literacy* 15
  - *Reading Literacy by Levels* 18
  - *Specific Skill Areas of Reading Literacy by Level* 18
  - *Linking Performance by Levels to PISA Items* 21
- Summary 22

Chapter 3: Mathematics and Science Literacy
- Key Findings 23
- Defining Mathematics Literacy 24
- Defining Science Literacy 25
- Mathematics and Science Literacy of PISA Countries 25
- The Distribution of Mathematics and Science Literacy 27
  - *National Percentiles* 27
  - *International Percentiles* 29
- Examples of Mathematics Items 32
- Examples of Science Items 34
- Summary 36

Chapter 4: Demographic Profiles of Reading, Mathematics, and Science Literacy

Key Findings 37
Gender 38
Parents' Education 40
Socioeconomic Status 42
Parents' National Origin 45
Language Spoken at Home 47
Race and Hispanic Origin 49
Summary 50

Chapter 5: Cross-Curricular Competencies and the Future of PISA

Key Findings 51
Attitudes Towards Reading 52
Learning Strategies 53
The Future of PISA 59

References 61

Appendix 1: Technical Notes 65

Appendix 2: Descriptions of International Studies of Reading, Mathematics, and Science 77

Appendix 3: Supporting Statistical Data 81

Appendix 4: PISA 2000 Released Items 115

LIST OF TABLES

APPENDIX 1 65

Table A1.1.—Coverage of target population, student and school samples, and participation rates, by country: 2000 69

Table A1.2.—Percentage distributions of 15-year-olds by grade and assessment subject, by country: 2000 70

APPENDIX 2 77

Table A2.1.—Descriptions of international assessments of reading 78

Table A2.2.—Descriptions of international assessments of mathematics 79

Table A2.3.—Descriptions of international assessments of science 80

APPENDIX 3 81

Table A3.1.—Combined reading literacy averages and subscale scores of 15-year-olds with standard errors, by country: 2000 82

Table A3.2.—Correlations of combined reading literacy and subscales, mathematics literacy and science literacy, by subject: 2000 83

Table A3.3.—Average combined reading literacy scores of 15-year-olds by percentiles with standard errors, by country: 2000 84

Table A3.4.—Percentage of 15-year-olds reaching the PISA top 10 percent, top 25 percent, top 50 percent, and top 75 percent on the combined reading literacy scale, by country: 2000 85

Table A3.5.—Percentage distribution and standard errors of 15-year-olds by combined reading literacy level, by country: 2000 86

Table A3.6.—Percentage distribution and standard errors of 15-year-olds by retrieving information level, by country: 2000 87

Table A3.7.—Percentage distribution and standard errors of 15-year-olds by interpreting texts level, by country: 2000 88

Table A3.8.—Percentage distribution and standard errors of 15-year-olds by reflecting on texts level, by country: 2000 89

Table A3.9.—Mathematics literacy and science literacy averages of 15-year-olds with standard errors, by country: 2000 90

Table A3.10.—Average mathematics literacy scores of 15-year-olds by percentiles with standard errors, by country: 2000 91

Table A3.11.—Average science literacy scores of 15-year-olds by percentiles with standard errors, by country: 2000 92

Table A3.12.—Percentage of 15-year-olds reaching PISA international benchmarks in mathematics literacy with standard errors, by country: 2000 93

Table A3.13.—Percentage of 15-year-olds reaching PISA international benchmarks in science literacy with standard errors, by country: 2000 94

Table A3.14.—Combined reading literacy averages by gender with standard errors, by country: 2000 95

Table A3.15.—Averages on the retrieving information reading literacy subscale by gender with standard errors, by country: 2000 96

Table A3.16.—Averages on the interpreting texts reading literacy subscale by gender with standard errors, by country: 2000 97

Table A3.17.—Averages on the reflecting on texts reading literacy subscale by gender with standard errors, by country: 2000 98

Table A3.18.—Mathematics literacy averages by gender with standard errors, by country: 2000 99

Table A3.19.—Science literacy averages by gender with standard errors, by country: 2000 100

Table A3.20.—Combined reading literacy averages by parents' education with standard errors, by country: 2000 101

Table A3.21.—Mathematics literacy averages by parents' education with standard errors, by country: 2000 102

Table A3.22.—Science literacy averages by parents' education with standard errors, by country: 2000 103

Table A3.23.—Relationship between parents' socioeconomic status and combined reading literacy, mathematics literacy, and science literacy scores with standard errors, by country: 2000 104

Table A3.24.—Combined reading literacy averages by parents' national origin with standard errors, by country: 2000 105

Table A3.25.—Mathematics literacy averages by parents' national origin with standard errors, by country: 2000 106

Table A3.26.—Science literacy averages by parents' national origin with standard errors, by country: 2000 107

Table A3.27.—Combined reading literacy averages by language spoken at home with standard errors, by country: 2000 108

Table A3.28.—Mathematics literacy averages by language spoken at home with standard errors, by country: 2000 109

Table A3.29.—Science literacy averages by language spoken at home with standard errors, by country: 2000 110

Table A3.30.—Reading, mathematics, and science literacy averages of U.S. 15-year-olds by race/ethnicity with standard errors: 2000 111

Table A3.31.—Percentage of 15-year-olds who agree or strongly agree that reading is a favorite hobby by gender with standard errors, by country: 2000 . . . 112

Table A3.32.—Percentage of 15-year-olds who report memorizing often or always when studying by gender with standard errors, by country: 2000 113

Table A3.33.—Percentage of 15-year-olds who report using an elaboration strategy often or always when studying by gender with standard errors, by country: 2000 114

LIST OF FIGURES

Figure 1.—Program for International Student Assessment (PISA) assessment cycle 2

Figure 2.—Participating countries in the Program for International Student Assessment (PISA) 2000 3

Figure 3.—Combined reading literacy average scores and average subscale scores of 15-year-olds, by country: 2000 11

Figure 4.—Distribution of combined reading literacy scores of 15-year-olds by percentiles, by country: 2000 13

Figure 5.—Percentage of 15-year-olds reaching the PISA top 10 percent and top 25 percent on the combined reading literacy scale, by country: 2000 14

Figure 6.—Cut point scores for combined reading literacy levels, by level: 2000 15

Figure 7.—Reading literacy subscale task descriptions, by level: 2000 17

Figure 8.—Percentage distribution of 15-year-olds by combined reading literacy scores, by level and by country: 2000 19

Figure 9.—Percentage of 15-year-olds scoring at levels 1 and 5 on the combined reading literacy scale, by country: 2000 20

Figure 10.—Mathematics and science literacy average scores of 15-year-olds, by country: 2000 26

Figure 11.—Distribution of mathematics literacy scores of 15-year-olds by percentiles, by country: 2000 28

Figure 12.—Distribution of science literacy scores of 15-year-olds by percentiles, by country: 2000 30

Figure 13.—Percentage of 15-year-olds reaching PISA international benchmarks in mathematics literacy, by country: 2000 31

Figure 14.—Percentage of 15-year-olds reaching PISA international benchmarks in science literacy, by country: 2000 33

Figure 15.—Differences in average scores in reading, mathematics, and science literacy of 15-year-olds by gender, by country: 2000 39

Figure 16.—Differences in combined reading literacy scores of 15-year-olds by parents' level of education, by country: 2000 41

Figure 17.—Relationship between parents' socioeconomic status and combined reading literacy, mathematics literacy, and science literacy scores, by country: 2000 44

Figure 18.—Differences in combined reading literacy scores of 15-year-olds by parents' national origin, by country: 2000 46

Figure 19.—Differences in combined reading literacy, mathematics literacy, and science literacy scores of 15-year-olds by language spoken at home, by country: 2000 48

Figure 20.—Comparisons of reading, mathematics, and science literacy average scores of U.S. 15-year-olds, by race/ethnicity: 2000 50

Figure 21.—Percentage of 15-year-olds who agree or strongly agree that reading is a favorite hobby, by country: 2000 53

Figure 22.—Percentage differences by gender of 15-year-olds who agree or strongly agree that reading is a favorite hobby, by country: 2000 54

Figure 23.—Percentage of 15-year-olds who report memorizing often or always when studying, by country: 2000 56

Figure 24.—Percentage differences by gender of 15-year-olds who report memorizing often or always when studying, by country: 2000 57

Figure 25.—Percentage of 15-year-olds who report using an elaboration strategy often or always when studying, by country: 2000 58

Figure 26.—Percentage differences by gender of 15-year-olds who report using an elaboration strategy often or always when studying, by country: 2000 60

Chapter

1

PISA—THE PROGRAM FOR INTERNATIONAL STUDENT ASSESSMENT

PISA
USA

PISA IN BRIEF

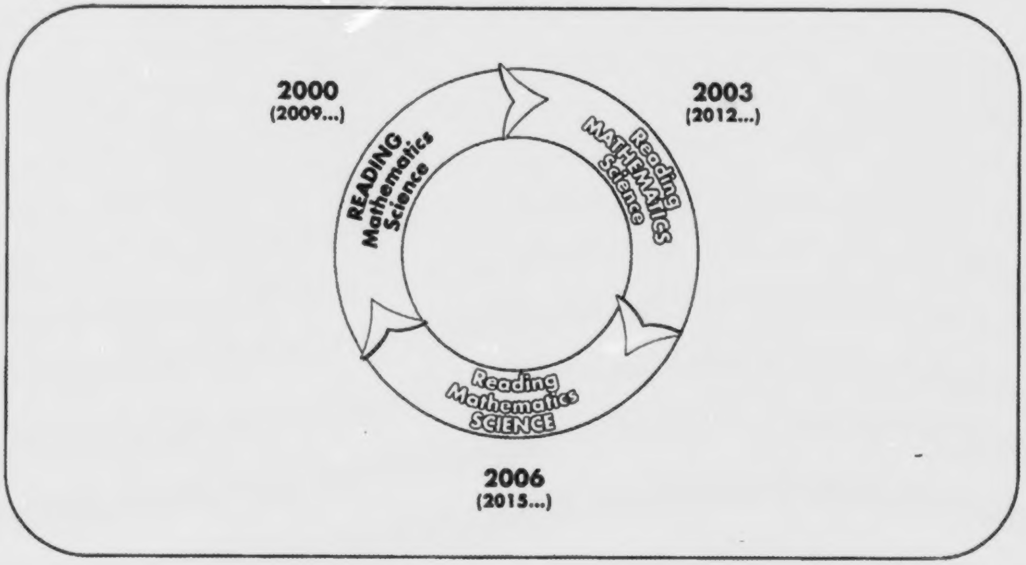
The Program for International Student Assessment (PISA) is a new system of international assessments that focus on 15-year-olds' capabilities in reading literacy, mathematics literacy, and science literacy. PISA also measures general or cross-curricular competencies such as learning strategies.

PISA will be implemented on a 3-year cycle that began in 2000. Each PISA assessment cycle focuses on one particular subject, although all three are assessed in each cycle. In this first cycle, PISA 2000, reading literacy is the major focus, occupying roughly two-thirds of assessment time. In 2003, PISA will focus on mathematics literacy, and in 2006, on science literacy (figure 1).

PISA will report on performance in reading literacy, mathematics literacy, and science literacy every 3 years, and provide a more detailed look at each domain in the years when it is the major focus. For instance, this report will provide average scores for specific reading processes such as retrieving information, interpreting texts, and reflecting on texts, as well as a combined reading literacy average score. Only single measures of mathematics and science literacy are available in PISA 2000, with more specific information to be provided for these domains in subsequent cycles. These cycles will allow countries to compare changes in trends for each of the three content areas over time. Future cycles will also include further development of the assessment of cross-curricular competencies, such as problem solving in 2003 and use of information and communications technology in 2006.

PISA is sponsored by the Organization for Economic Cooperation and Development (OECD), an intergovernmental organization of 30 industrialized nations that serves as a forum for member countries to cooperate in research and policy development on social and economic topics of common interest. PISA is a collaborative venture, with representatives from

Figure 1.—Program for International Student Assessment (PISA) assessment cycle



NOTE: The subject in all capital letters in each assessment cycle is the major domain for that cycle.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Figure 2.—Participating countries in the Program for International Student Assessment (PISA) 2000

OECD countries

Australia
Austria
Belgium
Canada
Czech Republic
Denmark
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Japan
Korea, Republic of
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Spain
Sweden
Switzerland
United Kingdom
United States

Non-OECD countries

Brazil
Latvia
Liechtenstein
Russian Federation

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed in this report. For information on the results for the Netherlands, see OECD (2001).

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

member country governments jointly steering the project through a Board of Participating Countries. At the international level, the Australian Council for Educational Research (ACER) leads a consortium that coordinates PISA under direction from the OECD.[1] In the United States, the National Center for Education Statistics (NCES) is responsible for U.S. data collection and represents the United States in the international management of the assessment. Westat, a private research firm, handled data collection in the United States for PISA 2000 under contract to NCES.

In 2000, 32 countries participated in PISA, including 28 OECD countries and 4 non-OECD countries (figure 2).[2]

To implement PISA 2000, each participating country selected a nationally representative sample of 15-year-olds. In the United States, this included nearly 4,000 students from both public

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[1] Other members of the PISA Consortium include the Netherlands National Institute for Educational Measurement (CITO), Educational Testing Service (ETS, USA), the National Institute for Educational Research (NIER, Japan), and Westat (USA).

[2] Another 12 countries will carry out a second round of the PISA 2000 assessment in 2002.

CHAPTER
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A3
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and nonpublic schools (table A1.1) from several different grade levels.[3] Appendix 1, Technical Notes, contains more information about sampling and other aspects of PISA 2000's design. Each selected student completed an approximately 90-minute assessment and a 20- to 30-minute questionnaire designed to gather information about his or her background and experiences related to reading, mathematics, and science literacy. Principals in schools where students took the PISA assessment also completed a background questionnaire about their schools. PISA 2000 consisted of a mix of multiple choice, short answer, and extended response questions. Assessments were conducted in the United States in the spring of 2000 by trained test administration field staff that visited each of the participating schools and administered both the assessments and the questionnaires.

PISA's Yield Measure of Learning

PISA's purpose is to represent the overall *yield* of learning for 15-year-olds. This yield is the sum of learning outcomes for 15-year-olds in reading, mathematics, and science literacy and is represented by national averages of student scores. PISA assesses the cumulative educational experiences of all students who are 15 years of age at the time of assessment, irrespective of the grade levels or type of institutions in which they are enrolled. PISA assumes that by the age of 15, young people have had a series of learning experiences, both in and out of school, that allow them to perform at particular levels in reading, mathematics, and science literacy. Clearly, formal education will have played a major role in their performance, but other factors, such as learning opportunities at home or elsewhere outside of school, also play a role. PISA's results provide a valuable indicator of the overall performance of a country's education system, but they also provide information about other factors that influence performance.

By assessing students near the end of compulsory schooling in key knowledge and skills, PISA provides information about how well prepared students will be for their future lives as they approach an important transition point for education and work. PISA is forward rather than backward looking in this sense, since it aims to show how equipped 15-year-olds are for their futures based on what they have learned up to that point.

The Unique Contribution of PISA

PISA grew out of OECD efforts to develop comparable measures of learning outcomes for policy use. By creating PISA, OECD member countries sought to develop a regular cycle of data collection in key areas. These data will provide information at the national and international level about how well countries are meeting their educational objectives. The OECD will use the data to produce indicators of educational systems, which provide a "quantitative description of the functioning of education systems that allows countries to see themselves in the light of other countries' performance" (OECD 1998, p.5).

A number of international comparative studies already exist to measure achievement in mathematics, science, and reading, including the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS). The Adult Literacy and Lifeskills survey (ALL) will measure the reading literacy skills of adults. In addition, the United States has been conducting its own national surveys of student achievement for more than 30 years through the National Assessment of Educational Progress (NAEP) program.

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[3] For information on distributions of students by grade in participating countries, see table A1.2, appendix 1.

Appendix 2 gives an overview of international studies in reading, mathematics, and science (tables A2.1, A2.2, and A.2.3). PISA differs from these studies in several ways.

- *Content.* While other studies, such as TIMSS and NAEP, have a strong link to curriculum frameworks and seek to measure students' mastery of specific knowledge, skills, and concepts, PISA is designed to measure "literacy" more broadly. PISA's content is drawn from broad content areas, such as space and shape for mathematics, in contrast to more specific curriculum-based content such as geometry or algebra.

- *Tasks.* In addition to the differences in purpose and age coverage between PISA and other international comparative studies, what students are asked to do on PISA tasks is also somewhat different. A study based on expert panels' reviews of mathematics and science items from PISA, TIMSS, and NAEP reports that PISA items require multistep reasoning more often than either TIMSS or NAEP (Nohara 2001). The study also shows that both PISA mathematics and science literacy items often involve the interpretation of charts and graphs or other "real world" material. The unique contribution of PISA lies in its focus on assessing students' knowledge and skills in reading, mathematics, and science in the context of everyday situations. These tasks reflect the underlying assumption of PISA: as 15-year-olds begin to make the transition to adult life, they need to know not only how to read, or understand particular mathematical formulas or scientific concepts, but also how to apply this knowledge and these skills in the many different situations they will encounter in their lives.

- *Age-Based Sample.* PISA collects information from an age-based sample, rather than a grade-based sample. Schools identify students who are 15 years of age, regardless of what grade they are in. In contrast, PIRLS, for example, collects reading literacy data for fourth-grade students, TIMSS 1999 collected mathematics and science data for eighth-grade students, and NAEP (main) collects data at various grade levels.[4] PISA uses an age-based sample for several reasons. First, PISA's goal is to represent outcomes of learning rather than outcomes of schooling. By placing the emphasis on age, PISA intends to show not only what 15-year-olds have learned in school, but outside of school as well and over the years, not just in a particular grade. In addition, years of education vary among countries (for example, 10th grade in the United States may not correspond to a similar educational level in other countries). Choosing an age-based sample makes comparisons across countries somewhat easier. One other international study does collect an age-based sample. The Adult Literacy and Lifeskills survey (ALL) will collect reading literacy data for adults aged 16 to 65. Although the ALL measures of reading literacy are slightly different than those for PISA, there will be efforts to link the performance of 15-year-olds to that of adults through a common set of items in order to examine the relationship of literacy to the labor market and other facets of adult life.

- *Age Level.* Since PISA seeks to show the overall yield of an educational system and the cumulative effects of all learning experiences, the age of 15 was chosen to represent a point in time at which these broad learning outcomes could be measured while all students were still required to be in school. The grade levels covered in other international assessments correspond roughly to the ages of 9, 13, and 17.

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[4] TIMSS does use some age criteria, but the sample of students is drawn from one grade rather than across grades as in PISA. For example, TIMSS 1999 required participating countries to assess students in the upper of the two grades with the largest proportion of 13-year-olds.

- *Information Collected.* The kind of information PISA collects also reflects its broad policy purpose. For example, in contrast to PISA, TIMSS collects background information intended to help provide an understanding of how teachers in different countries approach the task of teaching and provide insight into what effects these different approaches might have on student performance. The TIMSS video studies extend this work even further by actually capturing images of instruction across countries. PISA, on the other hand, collects only background information related to general school context and student demographics. No teacher questionnaires are included in this cycle of PISA. While its results can certainly inform education policy and spur further investigation into differences within and between countries, PISA is not meant to provide direct information about improving education in the classroom. Its purpose is to generate useful indicators to benchmark performance and inform policy.

The United States has been actively involved in the development of PISA since its inception, believing that PISA's differences from other studies allow it to complement the picture of U.S. performance obtained from other studies and provide a new perspective on U.S. education in an international context.

REPORT SUMMARY AND ORGANIZATION

This report focuses on U.S. results for PISA 2000. The OECD is also releasing a report discussing PISA 2000 results, but from an international perspective. The OECD report is being released at the same time as this U.S. national report, providing a wealth of information on PISA 2000.

The following chapters describe in detail PISA's definitions for reading literacy, mathematics literacy, and science literacy and U.S. performance on each of these measures. Chapter two discusses reading literacy and chapter three describes mathematics and science literacy. In addition to a discussion of national averages, chapters two and three take a closer look at the distributions of literacy across countries, including percentages of 15-year-olds meeting international benchmarks. Each of these chapters also describes sample PISA 2000 items, and discusses U.S. and international performance on selected items.

Chapter four describes differences in performance as they relate to demographic characteristics such as gender, race and ethnicity, parents' education, and others. Chapter five briefly discusses some examples of the general or cross-curricular competencies that will take on a growing role in PISA in future cycles, including attitudes toward learning and learning strategies such as memorization and elaboration. Finally, appendices provide technical information on how PISA 2000 was conducted, supporting statistical detail for the figures in the text, an overview of how PISA compares to other international studies, and a set of released sample PISA 2000 items for reading, mathematics, and science literacy.

Chapter

2

READING LITERACY

Key Findings

- On the combined reading literacy scale for PISA 2000, U.S. 15-year-olds perform about as well on average as 15-year-olds in most of the 27 participating OECD countries. Students in Canada, Finland, and New Zealand outperform U.S. students. U.S. students perform at the same level as students in 19 other participating OECD countries and Liechtenstein. U.S. students perform better on average than students from the OECD nations of Greece, Luxembourg, Mexico, and Portugal (figure 3; table A3.1).

- For each of the three specific reading process subscales, *retrieving information, interpreting texts,* and *reflecting on texts,* U.S. scores are not different from the OECD averages. Canada and Finland outscore the United States on each of the three reading process subscales, and the United States outscores at least seven other nations on each measure (figure 3; table A3.1).

- Fifteen countries, or about half of the countries participating in PISA 2000, show less variation in student performance than the United States. The remaining countries show similar variation in student performance to the United States, and U.S. variation is similar to the OECD average (table A3.3).

- The top 10 percent of OECD students score 623 or higher on the combined reading literacy scale. In the United States, 13 percent of students achieve this score or better, a percentage not different from the OECD top 10 percent benchmark. Three countries (Canada, Finland, and New Zealand) have a higher percentage of students score in the top 10 percent, while 14 countries have a lower percentage (figure 5; table A3.4).

- Percentages of U.S. students across the literacy levels are similar to the OECD average percentages, except at level 5. In the United States, 12 percent of 15-year-olds read at level 5, the highest proficiency level, a percentage higher than the OECD average. Level 1 encompasses 12 percent of students, and 6 percent of U.S. 15-year-olds are below level 1 (figure 8; table A3.5).

- Looking at the cumulative percentages of students from level to level, about one-third of U.S. students perform at the two highest levels, level 4 and level 5. In Finland, about half of the students perform at levels 4 and 5, and in Brazil, 4 percent of students do. About 60 percent of students in the United States perform at level 3 or above, and over 80 percent at level 2 or above. Finland, with the highest average combined reading literacy score, has 79 percent of students at level 3 or above, and 93 percent of students at level 2 or above (table A3.5).

Reading literacy is key in an information-abundant world. PISA builds upon the work of previous U.S. national and international studies in defining and reporting on reading literacy. This chapter describes the definition and reporting scales for reading literacy in PISA 2000, in which reading literacy is the major subject covered, and provides information on U.S. performance in an international context. Beginning with a description of national average scores, the discussion then turns to distributions of high-performing students, then to overall distributions of student scores, and finally to groups of students with particular sets of skills.

DEFINING READING LITERACY

PISA defines reading literacy as:

> ***Understanding, using, and reflecting on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society*** (OECD 1999, p.20).

Since PISA measures the achievement of 15-year-olds, it does not focus on the most basic reading skills. Instead, PISA seeks to measure the extent to which students can "construct, extend, and reflect on the meaning of what they have read" across a wide variety of texts associated with a wide variety of situations. PISA reading literacy tasks were constructed within three main dimensions. Mathematics and science literacy items fall within similar dimensions, as will be seen in the following chapter. The dimensions for the reading literacy tasks are:

- *Content or Structure*—refers to types of text, such as *continuous* and *noncontinuous texts*. Continuous texts are prose texts that are largely composed of sentences organized into paragraphs. Noncontinuous texts are those that are often organized as lists or charts (sometimes referred to as documents).
- *Processes*—consists of the kinds of processes used when reading a text, including *retrieving information, understanding texts at a general level, interpreting texts, reflecting on content of texts,* and *reflecting on form of texts.*
- *Situations*—distinguishes the use for which texts were constructed or the context in which knowledge and skills are applied, such as *private use, public use, occupational use,* or *educational use*. For example, private use refers to novels or personal letters, public use refers to official documents or announcements, occupational use refers to manuals or reports, and educational use refers to textbooks or worksheets.

In short, PISA measures how well 15-year-olds are able to apply different reading processes to a wide range of reading materials, such as the kinds of forms they receive from their governments, the kinds of articles they read in their local newspapers, the kinds of manuals they read for work or school, or the kinds of books or magazines they read for entertainment.

The basic form of the assessment reflects this range of materials and processes. Each reading literacy assessment unit consists of a passage of text, followed by a number of questions, some with a multiple-choice format and others requiring students to construct their own answers. Examples of reading assessment items are described later in this chapter and can be found in appendix 4.

SPECIFIC SKILL AREAS IN READING LITERACY

PISA 2000 provides information on three specific reading skill areas derived from the processes described above for gaining meaning from a text, *retrieving information, interpreting texts,* and *reflecting on texts.*

Retrieving information—the ability to locate one or more pieces of information in a text. All tasks require locating information in the text. The difficulty of any task is determined by how much information needs to be accessed, how explicitly it is signaled in the text, and whether the required pieces of information are interrelated or independent.

Interpreting texts—the ability to construct meaning and draw inferences from one or more parts of a text. The easiest tasks require identifying a main idea in the text. More difficult tasks require understanding relationships within the text that are an inherent part of its organization and meaning — that is, understanding how language is being used to convey meaning in context and comparing, contrasting, and/or categorizing ideas.

Reflecting on texts—the ability to relate a text to one's own experience, knowledge, and ideas. The easiest tasks require making a basic connection between the text and what the reader already knows. More difficult tasks involve comparisons between and/or a synthesis of information from the two sources.

Specific information on reading literacy proficiency could also be derived from the contents/structures or situations described above, as has been done in previous large-scale studies, including the International Association for the Evaluation of Educational Achievement (IEA) Reading Literacy Study (which describes literacy performance for narratives, exposition, and documents) and in the International Adult Literacy Study (which describes literacy performance for prose and documents). However, the emphasis on reading processes reflects the policy objectives of PISA most closely, and it is hoped that the development of three reading literacy process scales for PISA 2000 will provide a unique insight into the understanding of reading literacy. The three process subscales are based on the set of five processes described above *(retrieving information, understanding texts at a general level, interpreting texts, reflecting on content of texts,* and *reflecting on form of texts). Understanding texts at a general level* and *interpreting texts* are grouped together because both require a reader to process information from either the whole text or one part of the text. *Reflecting on content of texts* and *reflecting on form of texts* are grouped into a single scale because the distinction between reflecting on form and reflecting on content, in practice, was found to be difficult to make. In addition, the amount of information available made reporting on three reading literacy subscales more feasible than five.

It should be noted that there is overlap between the three subscales that are presented here: in practice, most tasks make a number of different demands upon readers, and individual readers may approach a task in different ways. Despite the interdependence of the three subscales, they may reveal interesting and useful distinctions both between countries and within countries.[5] Average scores are reported for each of these three reading process subscales. Together, these three subscale scores make up the combined reading literacy score.

READING LITERACY IN PISA COUNTRIES

Perhaps the simplest and most concise way to look at a country's yield in reading literacy is to examine its national average score. Performance for 15-year-olds on PISA 2000 is reported as a score ranging from 0 to 1,000, with most scores falling between 200 and 800. The scale is constructed so that the average score for students from all OECD countries is 500.[6] Because of the statistical techniques used to sample students, simply ranking countries based on their average score is not accurate.[7] In figure 3, the shading identifies countries whose averages are higher, lower, or not different from that of the United States on the combined reading literacy scale, and for each of the three reading process subscales.[8] Non-OECD countries are shown at the bottom of the figure with shading to indicate differences from the United States; however, non-OECD countries are not included in determining the OECD average.

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[5] The discussion in this section draws directly from Organization for Economic Cooperation and Development. (2001, April 18–20). *Described Proficiency Scales for PISA 2000.* Discussion document presented at the PISA Board of Participating Countries meeting, Paris, France.

[6] The average score for student performance on each scale (combined reading literacy scale, mathematics literacy scale, science literacy) is set at 500 and the standard deviation at 100, with the scale calibrated with equal weightings to results in each country. Since the calibration was performed on the combined reading literacy scale, average scores for the three reading process subscales differ slightly from 500, as shown in figure 3.

On the combined reading literacy scale, U.S. 15-year-olds perform about as well on average as 15-year-olds in most OECD countries. U.S. students perform better than students in the OECD countries Greece, Luxembourg, Mexico, and Portugal, and the non-OECD nations Brazil, Latvia, and the Russian Federation. Students in Canada, Finland, and New Zealand outperform U.S. students. U.S. students perform at about the same level as the other 19 participating OECD countries and Liechtenstein (figure 3; table A3.1). This finding is generally consistent with previous findings of the reading capabilities of U.S. students from a 1991 international study of reading literacy that placed U.S. 14-year-olds at levels similar to other OECD nations, and in which Finland outscored the United States (Elley 1992).

In each of the three reading process subscales, U.S. scores are not different from the OECD average. Canada and Finland outscore the United States on each of the three reading subscales, and the United States outscores at least seven other nations on each subscale (figure 3; table A3.1).

More countries outperform the United States in *retrieving information* (five countries) than in *interpreting texts* (two countries) or *reflecting on texts* (four countries). Australia and Korea, for instance, perform better than the United States in *retrieving information,* but not differently for *interpreting texts* or *reflecting on texts.*

There are clear consistencies across the three reading process subscales of *retrieving information, interpreting texts,* and *reflecting on texts,* which carry through to the *combined reading literacy* score. Nations with high scores in one area tend to have high scores in the others, and the correlations between the combined reading literacy scale and the specific reading subscales are high (table A3.2).

THE DISTRIBUTION OF READING LITERACY

National Percentiles

The average scores for reading literacy describe how a country performs overall compared to other nations, but they provide no information about the way scores are distributed in countries. One country with an average score similar to another could have large numbers of high- and low-scoring students, while the other country could have large numbers of students performing at about the average score. This section will discuss how distributions of scores for the combined reading literacy scale compare to one another, in order to begin to understand the variability of performance in a country as well as its average performance.

Comparing the U.S. average score to corresponding cut points in other countries provides a means to examine the variation in scoring. This can be seen graphically in figure 4, in which the 25th percentile in Finland and the 75th percentile score in Mexico correspond to approximately the U.S. average score. This

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[7] Average scores for each country are based on a sample of students, rather than all students, and are estimates of the population value of all 15-year-olds in each country. These estimates have a known degree of sampling error, the standard error, and an unknown degree of nonsampling error. The true average for any country lies within a range of approximately two times the standard error above and below the estimated score. See tables in appendix 3 for standard errors.

[8] Throughout this report, differences between averages or percentages that are statistically significant are described as "higher" or "lower." Differences that are not statistically significant are referred to as "similar to" or "not different from" each other. To determine whether differences reported are statistically significant, two-tailed t-tests at the .05 level were used. Bonferroni adjustments were made when more than two groups were compared simultaneously. See appendix 1 for more information on statistical procedures used for this report.

Figure 3.—Combined reading literacy average scores and average subscale scores of 15-year-olds, by country: 2000

Combined reading literacy score		READING SUBSCALES					
		Retrieving information		**Interpreting texts**		**Reflecting on texts**	
Country	Average	Country	Average	Country	Average	Country	Average
Finland	546	Finland	556	Finland	555	Canada	542
Canada	534	Australia	536	Canada	532	United Kingdom	539
New Zealand	529	New Zealand	535	Australia	527	Ireland	533
Australia	528	Canada	530	Ireland	526	Finland	533
Ireland	527	Korea, Republic of	530	New Zealand	526	Japan	530
Korea, Republic of	525	Japan	526	Korea, Republic of	525	New Zealand	529
United Kingdom	523	Ireland	524	Sweden	522	Australia	526
Japan	522	United Kingdom	523	Japan	518	Korea, Republic of	526
Sweden	516	Sweden	516	Iceland	514	Austria	512
Austria	507	France	515	United Kingdom	514	Sweden	510
Belgium	507	Belgium	515	Belgium	512	**United States**	507
Iceland	507	Norway	505	Austria	508	Norway	506
Norway	505	Austria	502	France	506	Spain	506
France	505	Iceland	500	Norway	505	Iceland	501
United States	504	**United States**	499	**United States**	505	Denmark	500
Denmark	497	Switzerland	498	Czech Republic	500	Belgium	497
Switzerland	494	Denmark	498	Switzerland	496	France	496
Spain	493	Italy	488	Denmark	494	Greece	495
Czech Republic	492	Spain	483	Spain	491	Switzerland	488
Italy	487	Germany	483	Italy	489	Czech Republic	485
Germany	484	Czech Republic	481	Germany	488	Italy	483
Hungary	480	Hungary	478	Poland	482	Hungary	481
Poland	479	Poland	475	Hungary	480	Portugal	480
Greece	474	Portugal	455	Greece	475	Germany	478
Portugal	470	Greece	450	Portugal	473	Poland	477
Luxembourg	441	Luxembourg	433	Luxembourg	446	Mexico	446
Mexico	422	Mexico	402	Mexico	419	Luxembourg	442
OECD average	500	OECD average	498	OECD average	501	OECD average	502
Non-OECD countries		Non-OECD countries		Non-OECD countries		Non-OECD countries	
Liechtenstein	483	Liechtenstein	492	Liechtenstein	484	Liechtenstein	468
Russian Federation	462	Latvia	451	Russian Federation	468	Latvia	458
Latvia	458	Russian Federation	451	Latvia	459	Russian Federation	455
Brazil	396	Brazil	365	Brazil	400	Brazil	417

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

☐ Average is significantly higher than the U.S. average ☐ Average is not significantly different from the U.S. average ☐ Average is significantly lower than the U.S. average means that 75 percent of Finnish students perform above the U.S. average, but 25 percent of Mexican students do.

Another way of looking at variability is to consider the number of score points (the size of the difference) between groups of students within a country. In the United States, for example, the 5th percentile score for combined reading literacy is 320. Ninety-five percent of U.S. students score above 320; in the same way, 5 percent of U.S. students score above 669, the 95th percentile score. This means the top 5 percent of U.S. students score at least 350 points higher than the bottom 5 percent (table A3.3).

Looking at the length of the bars in figure 4 gives a sense of how large the differences are between a country's highest and lowest performing students, but it does not describe how many students are high or low performing. As with average scores, because of the statistical techniques used to sample students, it is not accurate to rank countries' scoring variation based simply on the length of the bars shown in figure 4. Standard deviations of the combined reading literacy average scores give a mathematical way to tell how greatly scores are spread out from the country's average score (data not shown, see table A.3.3). Fifteen countries, or about half of the countries participating in PISA 2000, show less variation in student performance than the United States. Fifteen countries show similar variation to the United States, and no country has greater variation. Some countries that perform better on average than the United States, such as Canada and Finland, show less variation. In contrast, some countries that perform better on average also show similar variation, such as New Zealand.

International Percentiles

Another way to analyze how performance is distributed in countries is to look at what proportion of students in each country meets international benchmarks, standards of performance that are applied across countries. The international benchmarks or standards of performance used in this case are the percentages of students from each country who score in the top 10 percent, top 25 percent, top 50 percent, or top 75 percent internationally (figure 5; table A3.4).[9] Examining the top 10 and top 25 percent benchmarks allows a comparison of proportions of high-performing students between countries.

The top 10 percent of OECD students score 623 or higher on the combined reading literacy scale. In the United States, 13 percent of students achieve this score or better, a percentage not different from the OECD top 10 percent benchmark. Three countries (Canada, Finland, New Zealand) have a higher percentage of students score in the top 10 percent, while 14 countries have a lower percentage. Ten of these 14 countries have 5 percent or less of their 15-year-olds score in the top 10 percent.

The top 25 percent of all students score 571 or better on the combined reading literacy scale. Twenty-seven percent of U.S. 15-year-olds meet this benchmark (figure 5, page 14). Four countries have higher percentages of 15-year-olds at this benchmark, and 10 have lower percentages. Canada, Finland and New Zealand again have higher percentages of students meeting this benchmark than the United States; in this case, Australia's percentage of students is also higher than the U.S. percentage. Again, the U.S. percentage is similar to the OECD average, suggesting that the United States has proportions of high-performing 15-year-olds similar to other OECD countries on average.

This section describes how proportions of U.S. high-performing students compare to proportions of similarly high-performing students from other countries. Results show that the United States has similar proportions of students performing at each international benchmark to the OECD average. The following section takes a more detailed approach to analyzing variation between countries in student performance, by dividing

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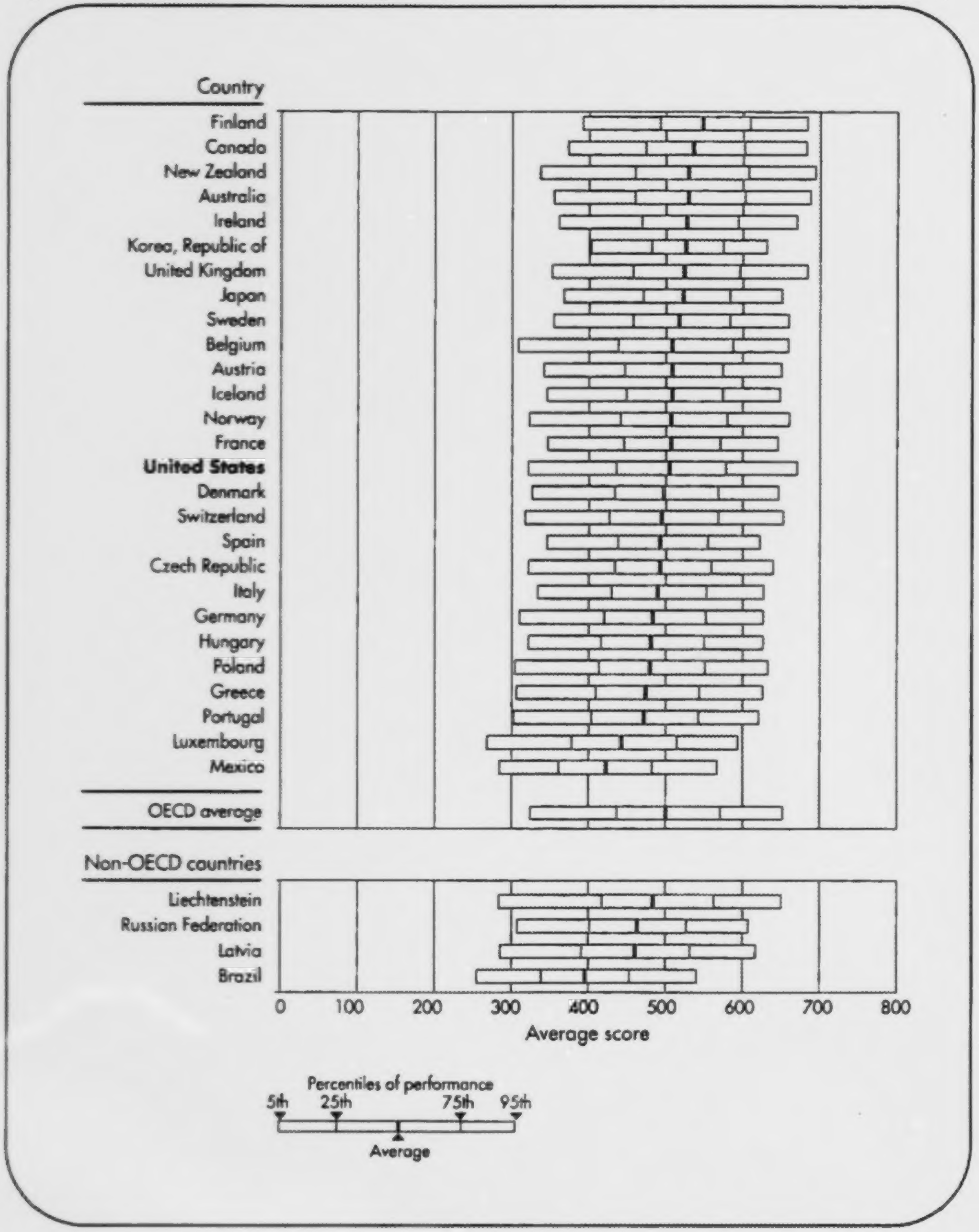
[9] To identify the score that separates the top 10 percent of students from the rest, the achievement results of 15-year-olds from all participating OECD countries are pooled. Differences in sample size between countries are adjusted so that all nations contribute equally to this pool. The 90th percentile of this distribution of scores is the cut point that identifies the top 10 percent benchmark.

Figure 4.—Distribution of combined reading literacy scores of 15-year-olds by percentiles, by country: 2000



NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Figure 5.—Percentage of 15-year-olds reaching the PISA top 10 percent and top 25 percent on the combined reading literacy scale, by country: 2000

Top 10 percent

Country	Percent
New Zealand	19
Finland	19
Australia	18
Canada*	18
United Kingdom	16
Ireland	15
United States	13
Belgium	13
Sweden	12
Norway	12
Japan	11
Iceland	10
Switzerland	10
Austria	9
Germany	9
France	9
Denmark	9
Czech Republic	7
Korea, Republic of	6
Poland	6
Italy	6
Hungary	5
Greece	5
Spain	[illegible]
Portugal	5
Luxembourg	2
Mexico	1
Non-OECD countries	
Liechtenstein	5
Latvia	4
Russian Federation	3
Brazil	1

Top 25 percent

Country	Percent
Finland	42
New Zealand	38
Canada	37
Australia	36
Ireland	34
United Kingdom	33
Belgium	31
Japan	30
Sweden	29
Norway	28
United States	27
Korea, Republic of	26
Austria	26
Iceland	26
France	25
Switzerland	24
Denmark	23
Germany	23
Czech Republic	20
Poland	19
Italy	18
Spain	18
Hungary	17
Greece	16
Portugal	15
Luxembourg	9
Mexico	4
Non-OECD countries	
Liechtenstein	18
Latvia	13
Russian Federation	12
Brazil	2

■ Percentage is significantly higher than the U.S. percentage

□ Percentage is not significantly different from the U.S. percentage

▨ Percentage is significantly lower than the U.S. percentage

*The shading of Canada in the top 10 percent category may appear incorrect; however, statistically, its placement is correct.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001).

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

students into groups based on their performance on particular kinds of items.

Levels of Proficiency in Reading Literacy

Another way to describe performance in reading literacy is to examine the proportions of students who can accomplish tasks at particular levels. This kind of analysis allows a further breakdown of average scores and an examination of groups of students who show similar skills. In PISA, reading literacy is a continuum rather than a dichotomy—that is, reading literacy is not something you have or don't have, but rather every 15-year-old shows a certain level of literacy skills. PISA measures what students can do at each of five designated levels. This section provides information about PISA 2000 reading items and the percentages of U.S. 15-year-olds who perform at each level on PISA 2000 in comparison to their international peers.

In order to reach a particular level, a student must be able to answer correctly a majority of items at that level.[10] This implies that students can also correctly answer items below their identified level. Students were classified into reading levels according to their scores (figure 6).

A small number of students in each country have scores below the lowest of the defined levels, level 1; that is, they are not able to routinely demonstrate the most basic type of knowledge and skills that PISA seeks to measure. These students score below 335 points on the PISA 2000 scale. These students may have serious difficulties in reading or other learning problems, diverse language backgrounds, or they may be students who for some other reason cannot or do not successfully complete the minimum PISA 2000 items. These students are not included in the proportions for students at level 1, but are considered as below level 1 because PISA 2000's descriptions of levels cannot accurately predict what skills these students may have.

PISA 2000 defines five skill levels for the three reading processes *(retrieving information,*

Figure 6.—Cut point scores for combined reading literacy levels, by level: 2000

Level	Score*
Below 1	334 and below
1	335 - 407
2	408 - 480
3	481 - 552
4	553 - 625
5	626 and above

*Exact cut point scores are as follows: below level 1: a score equal to or less than 334.75; level 1: a score greater than 334.75 and equal to or below 407.47; level 2: a score greater than 407.47 and equal to or below 480.18; level 3: a score greater than 480.18 and equal to or below 552.89; level 4: a score greater than 552.89 and equal to or below 625.61; and level 5: a score greater than 625.61.

NOTE: The Program for International Student Assessment (PISA) uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

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[10] Levels were defined such that students at the top of a level have a 62 percent chance of answering the hardest items in the level correctly and students at the bottom of the same level would have a 62 percent chance of answering the easiest items in that level correctly. For more information on the process for defining levels, see appendix 1, Technical Notes.

interpreting on texts, and *reflecting on texts)* and for a combined reading literacy measure. The kinds of tasks that represent each level of performance for the specific reading processes are described in figure 7.

Tasks for the combined reading literacy levels are defined by using elements from each of the specific reading process subscales. For example, the lowest level reading literacy tasks require students to locate single pieces of information with little or no competing information or draw simple inferences. The highest-level tasks require students to examine very complex texts, locate and organize multiple pieces of information, interpret language or apply unfamiliar categorization schemes, or evaluate and hypothesize about the information in the text.

As the figure illustrates, the level of the tasks for the *retrieving information* scale depends on how much information is requested, how clearly it is identified in the text, and whether or not the information stands alone or is embedded in the text. For example, given a short article about how good athletic shoes can help prevent injuries, students had to locate the answer to the question:

According to the article, why should sports shoes not be too rigid?

The answer is found at the beginning of a paragraph and uses the same wording as the question:

> If a shoe is too rigid, it restricts movement.

To receive full credit, students had to write an answer that referred to a restriction of movement, either using exactly these words or others that convey this idea. This item was considered a level 1 *retrieving information* item. A more difficult level 4 *retrieving information* item requires students to read an excerpt from a play, and from stage directions and dialogue, determine where the two characters are located on stage. These original passages and others that illustrate both the different reading processes *(retrieving information, interpreting texts,* and *reflecting on texts)* and a variety of literacy levels are included in appendix 4. Other sample items may be viewed in the OECD initial PISA 2000 report *Knowledge and Skills for Life—First Results from the OECD Programme for International Student Assessment* or the OECD's Web Site for PISA, www.pisa.oecd.org, by clicking on the menu item "sample test items."

The easiest tasks in *interpreting texts* require identifying a main idea in a text. For example, a level 1 *interpreting* task using the same article about athletic shoes described above requires students to identify the author's intent from a multiple choice list. More difficult tasks for *interpreting texts* require understanding relationships within a text that are an inherent part of its organization and meaning. The most difficult tasks are of two kinds. The first requires an understanding of how language is being used to convey meaning in context, and the second requires comparing, contrasting, or categorizing ideas in the text. An example of a level 5 *interpreting* item is also shown in appendix 4, in which students must examine a tree diagram describing the labor force structure in a country, and then use information from the diagram and its footnotes to categorize examples of workers into the same structure.

For *reflecting on texts,* the easiest tasks require making a basic connection between the text and the reader's own knowledge. Again, using the athletic shoe article as an example, a level 1 *reflecting* item based on the article requires students to examine a sentence from the article. Using their own knowledge, students have to then choose a description of how the parts of the sentence relate to one another from a multiple choice list, as below:

Look at this sentence from near the end of the article. It is presented here in two parts:

(first part)	"To avoid minor but painful conditions such as blisters or even splits or athlete's foot (fungal infections),..."
(second part)	"...the shoe must allow evaporation of perspiration and must prevent outside dampness from getting in."

Figure 7.—Reading literacy subscale task descriptions, by level: 2000

	Retrieving information	Interpreting texts	Reflecting on texts
Level 1	Locate one or more independent pieces of explicitly stated information, typically meeting a single condition or criterion, with little or no competing information in the text.	Recognize the main theme or author's purpose in a text about a familiar topic, when the idea is prominent or pervasive, either by being repeated or by appearing early in the text.	Make a simple connection between information in the text and common, everyday knowledge, with explicit direction to consider relevant factors in the task and the text.
Level 2	Locate one or more pieces of information, which may need to be inferred, and may need to meet several conditions, with some competing information present in the text.	Recognize the main idea in a text when the information is not prominent. Understand relationships or construe meaning within a limited part of the text, making low level inferences. Make comparisons or contrasts based on only one feature of the text.	Make a comparison or several connections between the text and outside knowledge. Draw on personal experience and attitudes to explain a feature of the text.
Level 3	Locate and, in some cases, recognize the relationship between several pieces of information that must meet multiple conditions set by the question, with prominent competing information.	Integrate several parts of a text in order to identify a main idea, understand a relationship, or construe the meaning of a word or phrase. Take into account many features in comparing, contrasting or categorizing, where required information is not prominent.	Make connections, comparisons, and explanations, or evaluate a feature of the text. Demonstrate a fine understanding of the text in relation to familiar, everyday knowledge. Draw on less common knowledge. Infer factors to be considered.
Level 4	Locate and organize several pieces of embedded information, typically in a text whose content and form are unfamiliar.	Construe the meaning of nuances of language in a section of text by taking into account the text as a whole. Show understanding and apply categories in an unfamiliar context.	Critically evaluate a text or hypothesize about information in the text, using formal or public knowledge. Demonstrate an accurate understanding of long or complex texts.
Level 5	Locate and organize several pieces of information in unfamiliar contexts, where some information is deeply embedded and its relevance must be inferred from the text.	Demonstrate a full and detailed understanding of a text whose content or form is unfamiliar. Deal with concepts that are contrary to expectations.	Critically evaluate or hypothesize about the content of texts, drawing on specialized knowledge. Deal with concepts that are contrary to expectations.

NOTE: The Program for International Student Assessment (PISA) uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

What is the relationship between the first and second parts of the sentence?

The second part

A. contradicts the first part.
B. repeats the first part.
C. illustrates the problem described in the first part.
D. gives the solution to the problem described in the first part.

More difficult tasks for *reflecting on texts* involve comparisons between something in the text and some element drawn from the reader's own experience, knowledge, or ideas. The most difficult tasks involve the synthesis of elements derived from both the text and outside knowledge. A level 4 *reflecting* task (shown in appendix 4) shows an information sheet on flu immunization. Students are then asked to describe why part of the text may be misleading, and must respond by critically evaluating the text in terms of potential contradictions or exaggerations.

Reading Literacy by Levels

The percentage of 15-year-olds at each level of reading literacy is shown in figure 8. In addition, figure 9 (page 20) shows the percentages of 15-year-olds at the highest and lowest levels of the combined reading literacy scale.

Overall, percentages of U.S. students across the levels are similar to the OECD average percentages, except at level 5. Twelve percent of U.S. 15-year-olds read at level 5, a percentage higher than the OECD average (table A3.5). Looking across the countries, the U.S. proportion of students at level 5 is greater than that in 14 countries and similar to that in 14 countries.

At level 4, the United States has 21 percent of students, compared to 3 percent in Brazil and 32 percent in Finland. Relative to U.S. 15-year-olds, five nations have higher percentages of their students reading at this level (Canada, Finland, Ireland, Japan, and Korea) and five nations have lower percentages of their 15-year-olds showing reading skills at level 4. Approximately one-quarter of U.S. students (27 percent) read at level 3, similar to the OECD average of 29 percent. Another 21 percent read at level 2, again similar to the OECD average percentage.

Twelve percent of 15-year-olds in the United States score at level 1, a percentage not different from that in 22 other nations or the OECD average. In other words, over two-thirds of all PISA 2000 participating countries have about the same percentages of students in level 1. Another 6 percent of 15-year-olds are below level 1 in the United States.

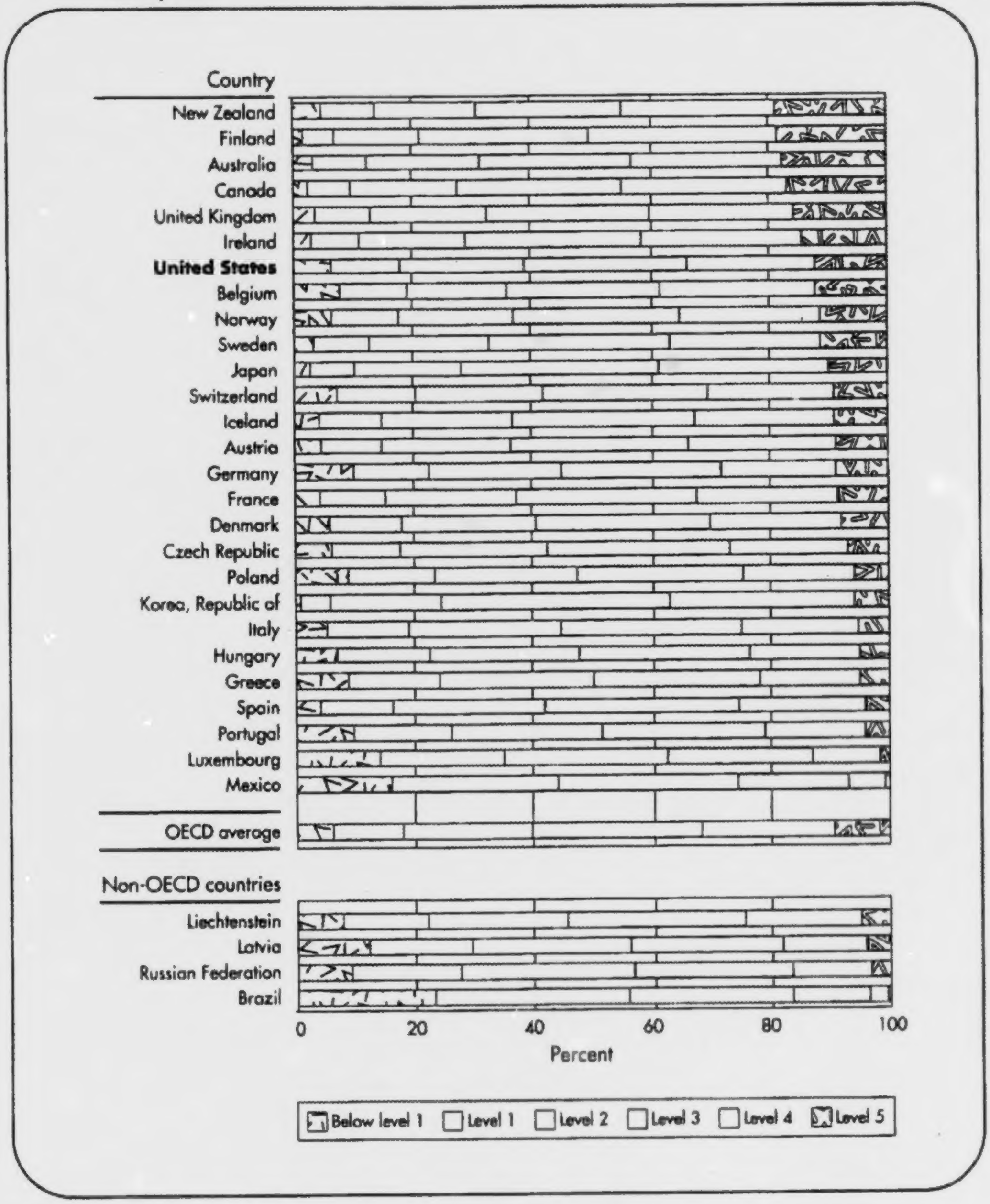
Looking at figure 8, one can see that in comparison to the United States, a few countries have large percentages of students at the highest levels and smaller numbers at the lowest levels (for example, Finland and New Zealand); a few countries have small percentages of students at the highest levels and larger numbers of students at the lowest levels (for example, Brazil and Mexico); and a few countries have large percentages of students at the middle levels and small percentages at either the lowest or highest levels (for example, Korea). Remaining countries, like the United States, have a majority of students at levels 2, 3, and 4, and relatively balanced percentages of students at the highest and lowest levels.

Another way to think about the levels is to consider not just the percentages of students at each particular level, but also to think about the cumulative percentages from level to level. For example, about one-third of U.S. students read at the two highest levels, level 4 or above. In Brazil, 4 percent of students perform at levels 4 or above, and in Finland, about half of the students do. About 60 percent of students in the United States perform at level 3 or above, and over 80 percent at level 2 or above. Finland, with a higher average combined literacy score than the United States, has 79 percent of students reading at level 3 or above, and 93 percent of students reading at level 2 or above.

Specific Skill Areas of Reading Literacy by Level

Specific measures tap the three defined processes of reading literacy described earlier: *retrieving information, interpreting texts,* and *reflecting on*

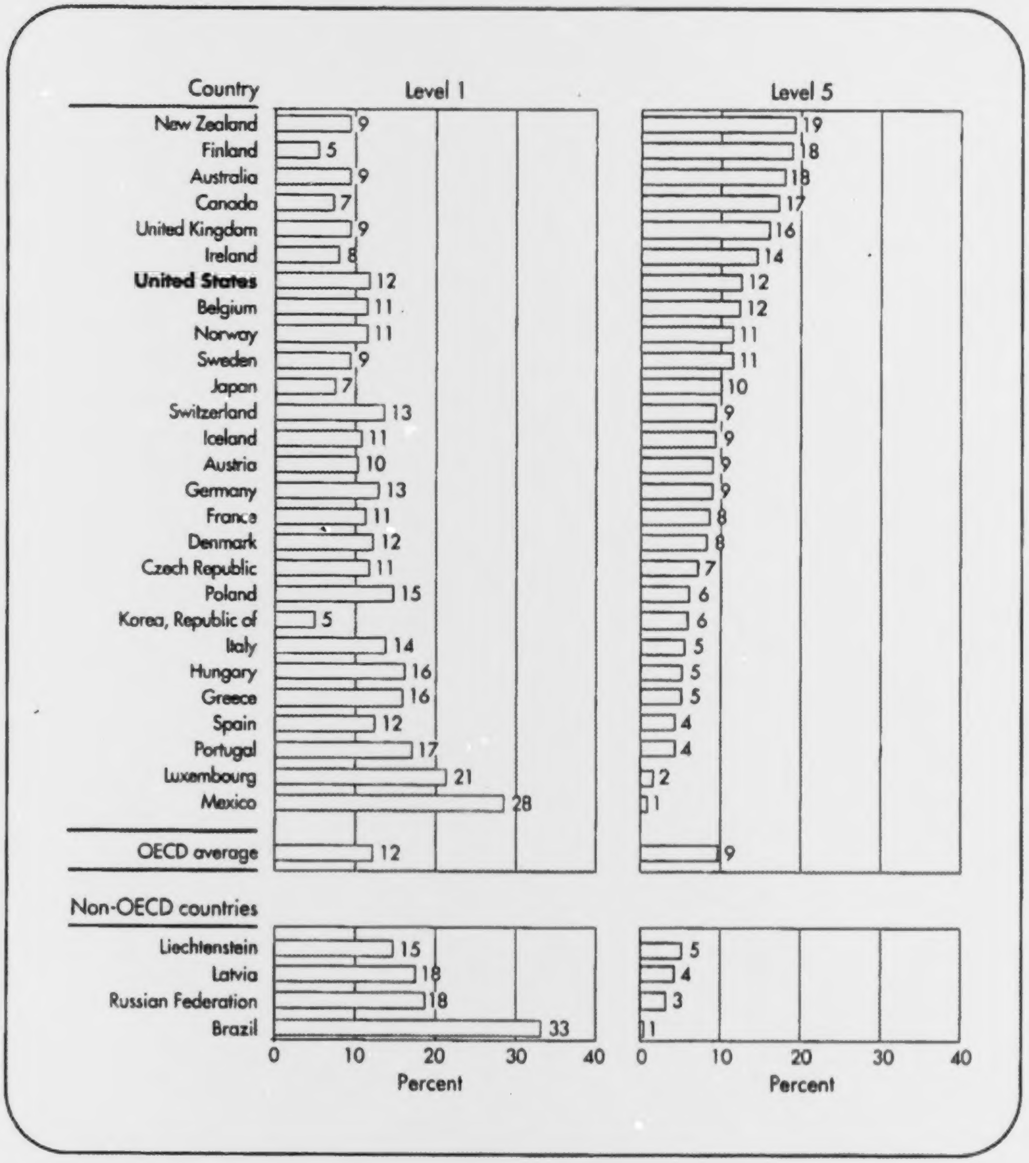
Figure 8.—Percentage distribution of 15-year-olds by combined reading literacy scores, by level and by country: 2000



NOTE: The Program for International Student Assessment (PISA) uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores. Although the Netherlands participated in PISA in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Figure 9.—Percentage of 15-year-olds scoring at levels 1 and 5 on the combined reading literacy scale, by country: 2000



NOTE: The Program for International Student Assessment (PISA) uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores. Although the Netherlands participated in PISA in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

texts. Percentages of students performing at each level for each of these reading process subscales are shown in tables A3.6, A3.7, and A3.8.

Looking across the countries, at almost every level on each reading literacy subscale, U.S. percentages of 15-year-olds are similar to the OECD average.[11] In general, few countries perform differently than the United States at any given level for each of the three scales, leaving a large group of countries that perform similarly to the United States.

For example, on the *retrieving information* subscale, five countries have greater percentages of 15-year-olds at level 5 than the United States, while eight countries have lower percentages, ranging from less than 1 percent in Brazil to 26 percent in Finland. That leaves 17 countries with percentages at level 5 similar to the U.S. percentage. At the opposite end of the scale, at level 1 for the *retrieving information* scale, three countries have a smaller proportion of students performing at this level than the United States and seven have a greater proportion.

On the *interpreting* scale, two countries have higher percentages of students at level 5. At the other end of the *interpreting* scale, three countries have a smaller proportion of 15-year-olds at level 1.

The U.S. has a greater percentage of students at level 5 on the *reflecting* scale than 10 countries, while 3 countries have greater percentages than the United States at the same level. The United States has a higher percentage of students at level 1 than four countries on the same *reflecting* scale. At levels 2, 3, and 4 on the *reflecting* scale the U.S. has similar percentages to the OECD average. At least two-thirds of countries are similar to the U.S. percentages at these levels.

Although patterns of scores for the reading literacy subscales vary *across* countries, generally *within* each country proportions of 15-year-olds at each level are similar across all three reading literacy subscales, as well as the combined reading literacy scale. In the United States, for instance, about 12 percent of students are at level 5 for *retrieving information, interpreting texts, reflecting on texts,* and for the combined reading literacy scale. In fact, the percentage of U.S. 15-year-olds across the three dimensions and the combined reading literacy scale is consistent at each level: about 21 percent for *retrieving information, interpreting texts,* and *reflecting on texts* at level 4; about 27 percent for each scale at level 3; about 21 percent at level 2 for each scale; about 12 percent at level 1; and about 6 percent below level 1. That is, there is no difference between percentages of U.S. 15-year-olds performing at high and low levels for the *retrieving information, interpreting texts,* or *reflecting on texts* scales.

Linking Performance by Levels to PISA Items

What do these U.S. results mean, then, in terms of the kinds of reading literacy questions PISA asks? Given that about 92 percent of U.S. students perform at level 1 and above on the *retrieving information* scale, a large proportion of students should be able to answer the level 1 question described above (see also appendix 4) about why athletic shoes should not be too rigid. Indeed, 84 percent of U.S. students answer this question correctly. On average 80 percent of students in OECD countries answer this question correctly. About 94 percent of U.S. students also perform at level 1 and above on the *interpreting* and *reflecting on texts* scales, so similarly large proportions of students should answer the level 1 question about how parts of a sentence from the athletic shoe article relate to one another correctly as well as the question about the author's intent. Seventy-eight percent of U.S. students do answer correctly the *reflecting* item about how parts of a sentence relate to one another, and 78 percent also answer correctly the *interpreting* item about author's intent.

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[11] At level 5 for the *interpreting texts* scale, the U.S. percentage is higher than the OECD average.

In the same way, for the level 4 *retrieving* item described above in which students had to locate two characters on stage using dialogue and stage directions from a play, about one-third of U.S. 15-year-olds (those at levels 4 and 5) should be able to answer this question a majority of the time. Actual responses show that 38 percent of U.S. 15-year-olds answer this item correctly, and an average of 47 percent of OECD students answer correctly. Forty-one percent of U.S. students also receive full credit for answering the level 4 *reflecting* item (using the flu immunization sheet, also described above and included in appendix 4) correctly. About 13 percent of U.S. students perform at level 5 on the *interpreting* scale, and indeed, 15 percent of U.S. students receive full credit for a level 5 *interpreting* item using the labor force structure diagram (see appendix 4). An average of 14 percent of OECD students receive full credit for the same item.

SUMMARY

The results in this chapter show that, in general, U.S. students perform similarly to the OECD average, both for the combined reading literacy scale and in the percentages of students who perform at each level on the specific reading subscales of *retrieving information, interpreting texts,* and *reflecting on texts*. Numbers of high performing students meeting international benchmarks are also similar to the OECD benchmarks, as is variation in student performance. The next chapter will discuss results of PISA 2000 for mathematics literacy and science literacy.

Chapter 3

MATHEMATICS AND SCIENCE LITERACY

Key Findings

- In both mathematics and science literacy, the United States average does not differ from the OECD average. Eight countries outperform the United States in mathematics literacy, and seven have higher average scores for science literacy. The United States has higher average scores than seven countries for mathematics literacy and seven for science literacy (figure 10; table A3.9).

- The top 10 percent of students in OECD countries score 625 or higher in mathematics literacy. In the United States, 9 percent of students score at this level or better, a percentage not different from the OECD top 10 percent benchmark. In eight countries, a greater proportion of students score in the top 10 percent, while six countries have a smaller proportion (figure 13; table A3.12).

- For science literacy, the top 10 percent of all students score 627 or higher. In the United States, 10 percent of students score at this level or better. Four countries have a higher percentage of students score in the top 10 percent, while seven countries have a lower percentage (figure 14; table A3.13).

In addition to assessing students in reading literacy, PISA 2000 tested the mathematics and science literacy of 15-year-olds in participating countries. As with reading literacy, PISA's mathematics and science literacy assessments focus on 15-year-olds' ability to apply mathematical and scientific principles and thinking in a wide variety of situations. As societies deal with changes and advances in technology, in medicine, in the environment, and in economic situations, mathematics literacy and science literacy are important skills for understanding and managing those changes.

As mentioned previously in this report, PISA 2000 concentrates on reading literacy, devoting two-thirds of testing time to this subject. The testing time remaining for the areas of mathematics and science literacy limits the number of items covering these topics in the assessment. As a result, a single scale is reported for each of mathematics and science literacy. Levels are not defined for either scale. The mathematics and science literacy scales are comparable to the combined reading literacy discussed earlier.

In discussing the results from the mathematics and science literacy portions of PISA 2000, it is important to understand the concept of mathematics and science literacy utilized by PISA. The following sections provide PISA's definitions of mathematics and science literacy and place these definitions in the context of the PISA 2000 assessments. As with the preceding chapter on reading literacy, this chapter begins by discussing national averages in mathematics and science literacy, and then examines score distributions within countries and across countries by using national and international benchmarks. Examples of mathematics and science literacy items are also presented.

DEFINING MATHEMATICS LITERACY

Just as reading literacy means more than the ability to read and write, mathematics literacy means more than the ability to add and subtract or perform other mathematical computations. PISA defines mathematics literacy as:

> ***the capacity to identify, to understand the role that mathematics plays in the world, to make well-founded mathematical judgments and to engage in mathematics, in ways that meet the needs of an individual's current and future life as a constructive, concerned and reflective citizen*** (OECD 1999, p.41).

As noted earlier, literacy in all three areas of reading, mathematics, and science is defined in terms of three dimensions—content, process, and situation. For mathematics literacy, the three dimensions are specified as follows:

- *Content or Structure*—includes broad mathematical concepts or content underlying mathematical thinking: *chance, change and growth, space and shape, reasoning, uncertainty and dependency relationships*. In PISA 2000, *change and growth* and *space and shape* were emphasized.
- *Process*—consists of thinking skills organized into three competency classes: *simple computations* or definitions; *connections* to be made to solve straightforward problems; and *mathematical thinking, generalization,* and *insight (reflection)* requiring students to analyze, identify mathematical elements in a given situation, and suggest new problems.
- *Situation*—comprises the situations in which mathematics knowledge and skills are applied, classified as: *private life/personal, school life, work and sports, local community and society,* and *scientific*.

In sum, PISA mathematics literacy items seek to measure how well students are able to apply a variety of mathematical processes to an assortment of problems—the kind of problems they solve for a school assignment; the kind they solve to help make home improvements; and the kind they encounter while reading a newspaper or magazine.

DEFINING SCIENCE LITERACY

In the broad conception used in PISA, science literacy means the ability to think scientifically, understand some specific scientific concepts, and take a scientific approach to problem solving. In this sense, science literacy is defined as:

> ***the capacity to use scientific knowledge, to identify questions, and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity*** (OECD 1999, p.60).

The specifics of the three defining dimensions—content, process, and situation—in the case of science literacy are as follows:

- *Content or Structure*—involves broad science concepts from physics, chemistry, biological sciences, and Earth and space sciences. Concepts are incorporated more particularly from themes such as *biodiversity, forces and movement,* and *physiological change,* and are organized into several broad areas of application: *science in life and health, science in Earth and environment,* and *science in technology.*
- *Process*—includes thinking skills organized into five processes: *recognizing scientifically investigable questions, identifying evidence needed in a scientific investigation, drawing or evaluating conclusions, communicating valid conclusions,* and *demonstrating comprehension of scientific concepts.*
- *Situation*—focuses on the situations in which scientific knowledge and skills are applied: *personal, public, global,* and situations of *historical relevance.*

As with the other PISA items, science literacy items seek to measure how well students are able to apply a variety of scientific skills to a diverse group of situations—the kind of situations they encounter while making a decision about an environmental referendum; the kind they encounter in trying to understand their own medical care or while reading information about disease prevention; or the kind they encounter in a scientific text. These definitions of mathematics and science literacy provide a basis for the following presentation of results from PISA 2000.

MATHEMATICS AND SCIENCE LITERACY OF PISA COUNTRIES

National averages provide the simplest description of performance for mathematics and science literacy. In PISA 2000, national averages in mathematics and science literacy are strongly correlated with each other, and with national averages in reading literacy. This is not surprising, considering that both PISA mathematics and science literacy items focus on the application of mathematical and scientific thinking to real-world situations, which often entails interpreting charts or other documents. Some items, particularly in science, also require significant amounts of reading. The United States' relative position compared to its international peers is approximately the same in both mathematics and science, and the countries scoring above and below the United States are largely the same for both subjects. More countries score higher than the United States in mathematics literacy and in science literacy than on the combined reading literacy scale. With this situation in mind, the discussion that follows considers mathematics and science literacy simultaneously. Departures from this pattern are highlighted.

In figure 10 (page 26), shading identifies countries whose averages are higher, lower, or not different from that of the United States in mathematics and science literacy. Non-OECD countries are shown at the bottom of the table with shading to indicate differences from the United States; however, non-OECD countries are not included in determining the OECD average.

Figure 10.—Mathematics and science literacy average scores of 15-year-olds, by country: 2000

Mathematics literacy		Science literacy	
Country	Average	Country	Average
Japan	557	Korea, Republic of	552
Korea, Republic of	547	Japan	550
New Zealand	537	Finland	538
Finland	536	United Kingdom	532
Australia	533	Canada	529
Canada	533	New Zealand	528
Switzerland	529	Australia	528
United Kingdom	529	Austria	519
Belgium	520	Ireland	513
France	517	Sweden	512
Austria	515	Czech Republic	511
Denmark	514	France	500
Iceland	514	Norway	500
Sweden	510	**United States**	499
Ireland	503	Hungary	496
Norway	499	Iceland	496
Czech Republic	498	Belgium	496
United States	493	Switzerland	496
Germany	490	Spain	491
Hungary	488	Germany	487
Spain	476	Poland	483
Poland	470	Denmark	481
Italy	457	Italy	478
Portugal	454	Greece	461
Greece	447	Portugal	459
Luxembourg	446	Luxembourg	443
Mexico	387	Mexico	422
OECD average	500	**OECD average**	500
Non-OECD countries		Non-OECD countries	
Liechtenstein	514	Liechtenstein	476
Russian Federation	478	Russian Federation	460
Latvia	463	Latvia	460
Brazil	334	Brazil	375

▨ Average is significantly higher than the U.S. average
☐ Average is not significantly different from the U.S. average
■ Average is significantly lower than the U.S. average

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

As noted earlier, both assessments generated a single literacy score between 0 and 1,000 (with most scores falling between 200 and 800) for each student in each of the subjects. Country averages constructed from these scores provide the basis to compare countries in each subject.

In both mathematics and science literacy, the United States' average does not differ from the OECD average. Compared to the U.S. average, eight countries have higher average scores in mathematics literacy, and seven countries have higher scores in science literacy. The same seven countries appear in both groups—Australia, Canada, Finland, Japan, Korea, New Zealand, and the United Kingdom. For mathematics literacy, the average score for Switzerland is also higher than the U.S. average score. In mathematics literacy, 15 countries score similarly to the United States; in science literacy that number is 16 nations. The United States performs better than seven countries for mathematics literacy and seven countries for science literacy. Six of the same countries appear in both of those groups—Brazil, Greece, Latvia, Luxembourg, Mexico, and Portugal. In addition, the United States outperforms Italy in mathematics literacy and the Russian Federation in science literacy.

Despite differences in the frameworks for mathematics and science in TIMSS 1999 and PISA and a difference in the age of students being assessed, some countries with average scores higher than the United States in TIMSS 1999 also have higher average scores in PISA 2000. For example, Australia, Canada, Japan, and Korea have higher average scores than the United States in PISA 2000 for mathematics and science literacy, and also have higher scores for mathematics and science in TIMSS 1999. New Zealand, which has an average score not significantly different from the United States score for mathematics and science on TIMSS 1999, has a higher average score for mathematics and science literacy on PISA 2000.

THE DISTRIBUTION OF MATHEMATICS AND SCIENCE LITERACY

National Percentiles

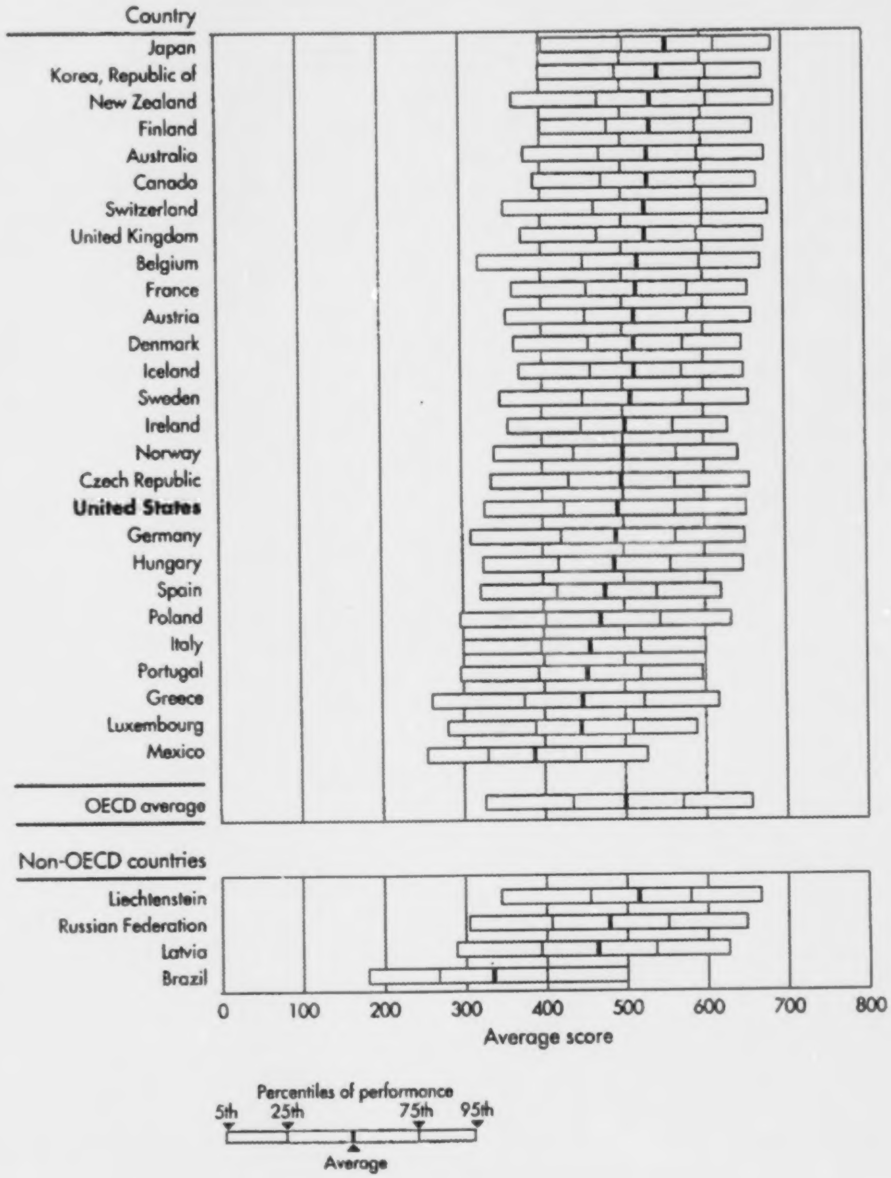
Average scores for mathematics and science literacy, while providing a concise way to describe performance, provide no information about the way scores are distributed in countries. This section, as with the previous discussion of reading literacy, looks at national percentile scores and score distributions in order to provide some information about how the scores that make up each country's average score vary.

Examining selected score cut points (for the 5th and 95th percentiles, in this case) within countries provides one means to compare distributions across countries. For example, to be among the top 5 percent of scorers in Brazil requires a score of 499 or better, in the United States it requires a score of 652 or better, and in New Zealand it requires a score of 689 or better. The cutoff point to identify the bottom 5 percent of scorers begins at 179 in Brazil, 327 in the United States, and 402 in Japan.

It is also possible to compare the U.S. average score to corresponding cut points in several countries. Figure 11 (page 28) shows graphically that while the average U.S. mathematics literacy score is 493, that is the 25th percentile score in Korea. This means that 75 percent of Korean students score at or above the U.S. average. Similarly, a score of 493 is just under the 90th percentile score in Mexico, which means that about 10 percent of Mexican students perform at or above the U.S. average for mathematics literacy.

An examination of the size of the score point difference between the top 5 percent and bottom 5 percent of scorers in a country also gives a sense of the variability of scores. The bottom 5 percent of U.S. students score 327 or less, but the top 5 percent score 652 or better, which means that there is at least a 325 point difference between the top 5 percent and bottom 5 percent of 15-year-olds for mathematics literacy in the United States. The length of the bars in figure 11 gives a visual indication of these kinds of differences in scores between a country's highest and lowest performing students.

Figure 11.—Distribution of mathematics literacy scores of 15-year-olds by percentiles, by country: 2000



NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

It is not accurate to rank countries' scoring variation based on the length of these bars because of the statistical techniques used to sample students, but standard deviations of the scores give a technical way to examine variations in scores within a country to learn how greatly scores within a country differ from their average scores (data not shown; see table A3.10). For mathematics literacy, seven countries have less variation in performance than the United States. No country has greater variation in performance than the United States, but U.S. variation in performance is similar to that in 23 other countries. It is also similar to the OECD average variation.

For science literacy, the story is similar to mathematics literacy. Looking at the U.S. average for science literacy in comparison to selected cutpoints for other countries shows differences in distributions of scores (figure 12, page 30). The average score for science literacy in the United States is 499, and, as with mathematics literacy, about 75 percent of Korean 15-year-olds score above the U.S. average. That is, the U.S. average for science literacy corresponds to the 25th percentile in Korea. The U.S. science literacy average also corresponds to approximately the 90th percentile in Mexico, showing that about 10 percent of Mexican 15-year-olds perform above the U.S. average for science literacy.

Again, the figure gives a sense of the spread of scores for each country. In the United States, the top 5 percent of 15-year-olds score at or above 658, while the bottom 5 percent score at or below 330, a difference of 328 points at a minimum. Comparing standard deviations of the average scores for science literacy gives a statistically accurate way to describe variation in performance, and shows that, as with mathematics literacy, a few countries (6 countries) have less variation in performance than the United States (data not shown; see table A3.11). The majority of countries (24 countries) show similar variation in performance to the United States, and the U.S. variation is similar to the OECD average.

International Percentiles

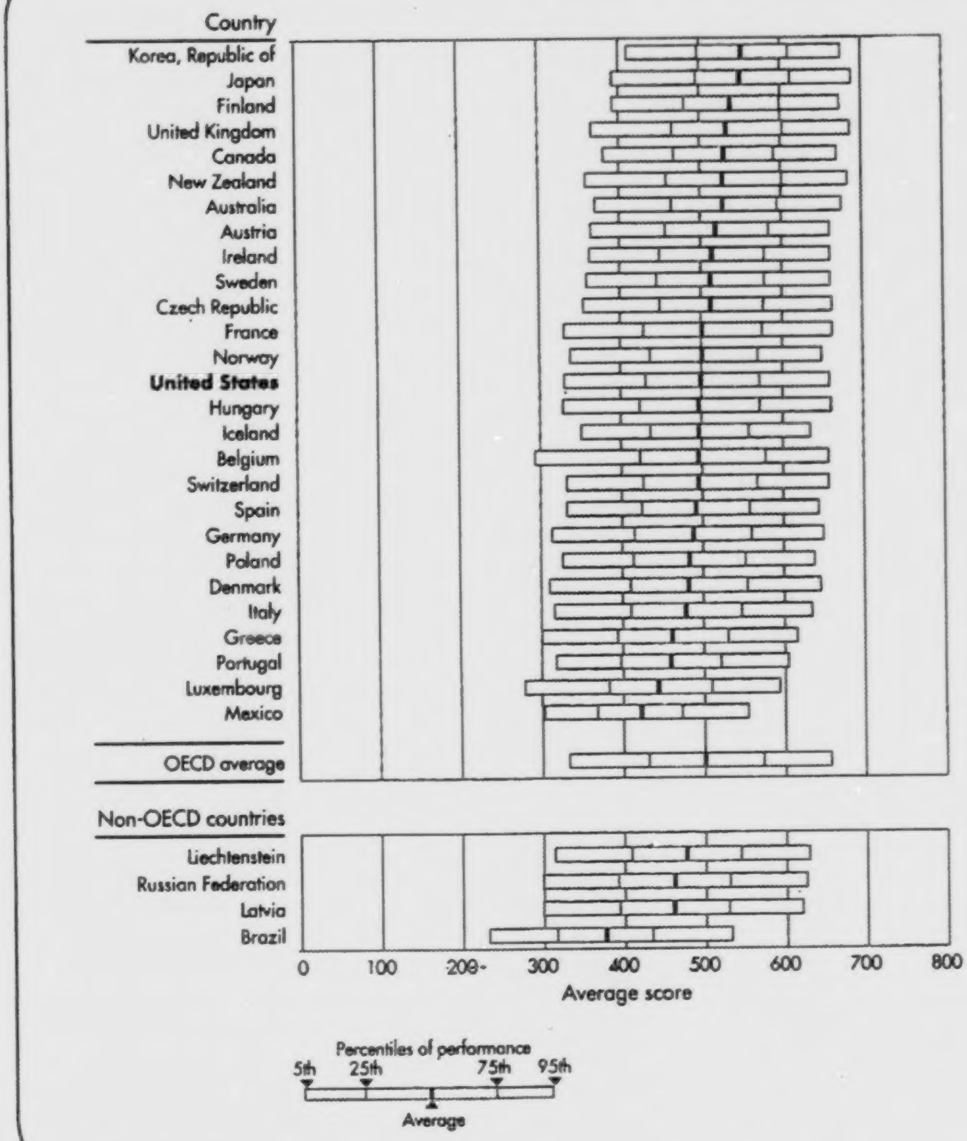
Scores for 15-year-olds from each PISA 2000 participating country can also be analyzed by sorting them into groups that meet international benchmarks—in this case, proportions of students from each country who are among the top 10 and top 25 percent of students from all countries combined. This provides another means to examine how scores are distributed across countries by showing which countries have greater proportions of students performing at high levels internationally.

The top 10 percent of students in OECD countries score 625 or higher in mathematics literacy. In the United States, 9 percent of students achieve this score or better, a percentage not different from the OECD top 10 percent benchmark. Eight countries have a greater proportion of students score in the top 10 percent, while six countries have a smaller proportion (figure 13, page 31; table A3.12).

Twenty-two percent of U.S. 15-year-olds meet the top 25 percent international benchmark, which requires a score of 571 or better. Nine countries have higher percentages at this benchmark, and six have lower percentages. The same eight countries that have higher percentages of students in the top 10 percent than the United States also have a greater percentage in the top 25 percent, with the addition of Belgium for this benchmark.

Figure 13 shows that Japan, for instance, has the same percentage of students (22 percent) reaching the top 10 percent benchmark as the United States has of students reaching the top 25 percent benchmark (also 22 percent). This means that 22 percent of Japanese students score at or above 625 in mathematics literacy, compared to 9 percent of U.S. students. Similarly, Mexico has about the same percentage of students in the top 50 percent (8 percent; data not shown, see table A3.12) as the United States has in the top 10 percent. This means that about 8 percent of Mexican students score at or above 505 in mathematics literacy, compared to about 46 percent of U.S. students.

Figure 12.—Distribution of science literacy scores of 15-year-olds by percentiles, by country: 2000



NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Figure 13.—Percentage of 15-year-olds reaching PISA international benchmarks in mathematics literacy, by country: 2000

Top 10 percent		Top 25 percent	
Country	Percent	Country	Percent
Japan	22	Japan	46
New Zealand	19	Korea, Republic of	41
Korea, Republic of	17	New Zealand	39
Switzerland	17	Switzerland	36
Belgium	16	Belgium	35
Australia	15	Finland	34
United Kingdom	15	Australia	34
Canada	14	Canada	34
Finland	13	United Kingdom	33
Austria	11	France	29
France	11	Austria	29
Sweden	10	Denmark	27
Czech Republic	10	Sweden	26
Iceland	9	Iceland	26
United States	9	Norway	23
Denmark	9	Czech Republic	23
Germany	9	Germany	22
Hungary	8	**United States**	22
Norway	8	Ireland	21
Poland	6	Hungary	21
Ireland	6	Poland	16
Spain*	4	Spain	15
Greece	4	Greece	13
Italy	2	Italy	10
Portugal	2	Portugal	10
Luxembourg	2	Luxembourg	8
Mexico	#	Mexico	1

Non-OECD countries		Non-OECD countries	
Liechtenstein	12	Liechtenstein	30
Russian Federation	8	Russian Federation	20
Latvia	5	Latvia	15
Brazil	#	Brazil	1

■ Percentage is significantly higher than the U.S. percentage

☐ Percentage is not significantly different from the U.S. percentage

■ Percentage is significantly lower than the U.S. percentage

*The shading of Spain in the top 10 percent category may appear incorrect; however, statistically, its placement is correct.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001).

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

For science literacy, the top 10 percent of all students score 627 or higher. In the United States, 10 percent of students achieve this score or better. Four countries have a higher percentage of students in the top 10 percent, while seven countries have a lower percentage (figure 14; table A3.13).

Four of the eight countries with higher percentages of students in the top 10 percent than the United States for mathematics literacy (Japan, Korea, New Zealand, and the United Kingdom) also have higher percentages than the United States for science literacy. In both cases, Japan has about double the percentage of students in the top 10 percent than the United States.

Twenty-five percent of U.S. students score at or above the cut point score of 572 for the top 25 percent benchmark in science literacy. Seven countries have a higher percentage, and seven have lower percentages. The same four countries (Japan, Korea, New Zealand, and the United Kingdom) that have higher percentages of students in the top 10 percent than the United States for science literacy also have more students in the top 25 percent, with the addition of Australia, Canada, and Finland for this benchmark.

Four countries (Japan, Korea, New Zealand, and the United Kingdom) have more students meeting both the 10 percent and 25 percent benchmark in mathematics *and* science literacy than the United States. In general, however, more countries have higher percentages of students meeting the international benchmarks than the United States for mathematics literacy than science literacy. The United States percentages for both the 10 percent and 25 percent benchmarks in mathematics and science literacy are consistent.

EXAMPLES OF MATHEMATICS ITEMS

One way of developing a deeper understanding of what types of mathematics questions are asked of students in PISA 2000 is to examine actual mathematics items from the assessment. Because mathematics literacy is a minor area in the 2000 assessment, there are not enough released items at this point in time to show the broad range of content, process, and situations students are presented with in PISA 2000. However, the items described below do provide a glimpse into the mathematics component of PISA 2000.

As is the case of reading literacy, PISA mathematics items are divided into units that contain a short text or picture, and several questions or items that require the use of the text or picture to answer. For example, in the unit "Continent Area" students are provided with a map of Antarctica and a companion scale, and are asked to estimate the area of the continent using the map scale. This item and other mathematics and science items are shown in appendix 4. Students are also asked to show their work and explain how they made their estimate. Full credit answers require students to provide a correct estimate. The correct estimate is from 12 million to 18 million square kilometers. Students show evidence of using a correct method through drawing a square, rectangle, or circle around the continent and using those dimensions to estimate the area. In addition, students can add the areas of several regular geometric figures they draw on the map. Students who provide a correct estimate and show evidence of other correct methods, or just provide the correct estimate, also receive full credit. This question corresponds to a score of 722 on the mathematics literacy scale.[12] This means that a student with a score of 722 or higher could answer this question a majority of the time. This is above the score of 625 at which the top 10 percent of all students score. Ten percent of U.S. students receive full credit for the

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[12] PISA's items are scaled such that for an item corresponding to a score of 722, students who score 722 on that scale will have a 62 percent probability of answering the item correctly. Students with a score above 722 will have a higher probability of answering the item correctly, and students with scores lower than 722 will have a lower probability of answering the item correctly.

Figure 14.—Percentage of 15-year-olds reaching PISA international benchmarks in science literacy, by country: 2000

Top 10 percent		Top 25 percent	
Country	Percent	Country	Percent
Japan	20	Japan	43
Korea, Republic of	18	Korea, Republic of	43
United Kingdom	17	Finland	36
New Zealand	16	New Zealand	36
Finland	15	United Kingdom	35
Australia	15	Australia	34
Canada	14	Canada	33
Austria	11	Austria	30
Czech Republic	11	Sweden	28
Belgium	11	Ireland	27
Ireland	11	Belgium	27
France	11	Czech Republic	27
Sweden	11	France	26
Hungary	10	**United States**	25
United States	10	Hungary	24
Switzerland	10	Norway	24
Norway	8	Switzerland	23
Germany	8	Germany	21
Denmark	8	Spain	21
Spain	7	Iceland	20
Poland	7	Denmark	20
Iceland	6	Poland	19
Italy	6	Italy	17
Greece	4	Greece	13
Portugal	3	Portugal	11
Luxembourg	2	Luxembourg	8
Mexico	1	Mexico	3

Non-OECD countries		Non-OECD countries	
Russian Federation	5	Liechtenstein	18
Liechtenstein*	4	Russian Federation	14
Latvia	4	Latvia	13
Brazil	#	Brazil	2

■ Percentage is significantly higher than the U.S. percentage
☐ Percentage is not significantly different from the U.S. percentage
■ Percentage is significantly lower than the U.S. percentage

*The shading of Liechtenstein in the top 10 percent category may appear incorrect; however, statistically, its placement is correct.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001).

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

question, with another 38 percent getting partial credit. On average in OECD countries, 20 percent of students receive full credit and another 40 percent receive partial credit for this question.

This problem falls under the content category of *space and shape,* and requires students to demonstrate their mathematical skills and knowledge in a *private life/personal* situation. In terms of process, this item requires making *connections* to solve the problem.

Another mathematics unit ("Triangles," shown in appendix 4) asks students to determine which of five figures presented fits a specific geometric description. This item corresponds to a score of 546 on the mathematics literacy scale.[13] In the United States, 46 percent of students answer this question correctly, while an average of 62 percent of students in OECD countries answer correctly.

This question is also from the content category *space and shape*, and requires a *computation* process in a *scientific* situation.

These items show, in a limited way, the kind of applied reasoning and real-life contexts that PISA seeks to employ in its assessment items. As noted, additional examples of items can be found in the OECD international report on PISA 2000 *Knowledge and Skills for Life—First Results from the OECD Programme for International Student Assessment* and on the OECD PISA Web Site, www.pisa.oecd.org. The next cycle of PISA in 2003, in which mathematics literacy will be the major subject, will contain a much larger range of items in terms of content areas as well as processes and situations.

EXAMPLES OF SCIENCE ITEMS

Similar to the situation with mathematics, the number of released science literacy items from PISA 2000 is relatively small, and does not allow the opportunity to discuss the broad range of content, process, and situations students are faced with in the science literacy portion of PISA 2000. However, the following items are illustrative of some of the types of questions students are presented in PISA 2000. Again, the full text of these samples and others can be found in appendix 4.

In one example, students are presented with a brief passage from an article on the ozone layer. Using the passage, students are asked to answer the following question:

> Lines 14 and 15 state: "Without this beneficial ozone layer, humans would be more susceptible to certain diseases due to the increased incidence of ultra-violet rays from the Sun."
>
> Name one of these specific diseases.

To receive full credit, students must refer to skin cancer (or melanoma). This question requires students to *demonstrate understanding of scientific concepts* in a *global* situation, and draw on their everyday knowledge of *physiological change (science in life and health)* related to sun exposure. This question corresponds to a score of 560 on the science literacy scale.[14] This is 10 points below the score at which the top 25 percent of all students can be identified. In the United States, 63 percent of students answer this question correctly; on average in the OECD, 63 percent of students also answer correctly.

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[13] See footnote 12.

[14] See footnote 12.

Another question based on the same ozone article asks:

> At the end of the text, an international meeting in Montreal is mentioned. At that meeting lots of questions in relation to the possible depletion of the ozone layer were discussed. Two of those questions are given in the following table.
>
> Which of the questions below can be answered by scientific research?
>
> Circle Yes or No for each.

Question:	Answerable by scientific research?
Should the scientific uncertainties about the influence of CFCs on the ozone layer be a reason for governments to take no action?	Yes / No
What would the concentration of CFCs be in the atmosphere in the year 2002 if the release of CFCs into the atmosphere takes place at the same rate as it does now?	Yes / No

To receive full credit, students must indicate "No" for the first question and "Yes" for the second. This item required students to use their knowledge of *science in the Earth and environment* and to *recognize scientific questions*. This item corresponds to a score of 542 on the science literacy scale.[15] Sixty-four percent of U.S. students respond correctly to this question, and an average of 59 percent of students in OECD countries respond correctly.

As with the mathematics literacy items above, these examples show in a limited way the kind of applied reasoning and real-life contexts that PISA seeks to employ in its assessment items. Science literacy will be the main PISA subject in 2006. During that cycle, science literacy items will take on a greater role in PISA, and the breadth of items will be much greater than those used in PISA 2000.

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[15] See footnote 12.

SUMMARY

The results presented in this chapter show that, in general, the United States performs similarly to the OECD average for both mathematics literacy and science literacy. However, more countries outperform the United States for mathematics and science literacy than for reading literacy. At the same time, more countries have similar variation to the United States in mathematics and science literacy (23 countries and 24 countries, respectively) than for reading literacy, where 15 countries are similar to the United States. This suggests that while more countries have less variation in average scores than the United States for reading literacy, this does not necessarily mean that they perform better than the United States.

Percentages of U.S. students meeting international benchmarks are also similar to OECD percentages, showing a distribution similar to most OECD countries. A few countries have higher percentages of students meeting top benchmarks in several areas. For example, New Zealand has higher percentages of students in the top 10 percent than the United States for reading literacy, mathematics literacy, and science literacy. Korea, in contrast, has a lower percentage of students in the top 10 percent for reading literacy than the United States, but a higher percentage for mathematics and science literacy. These percentages help illustrate in which areas different countries perform particularly well compared to the United States.

The next chapter will examine how different subgroups of students—such as males and females, students with different language backgrounds, students with parents of varying educational backgrounds, and different racial and ethnic groups in the United States—perform on reading, mathematics, and science literacy in PISA 2000.

Chapter

4

DEMOGRAPHIC PROFILES OF READING, MATHEMATICS, AND SCIENCE LITERACY

Key Findings

- On the combined reading literacy scale, females outperform males in every country. On the PISA 2000 mathematics literacy assessment, performance of males and females in the United States is similar, as it is in 16 other countries. For most countries (26 out of 31 countries), including the United States, males and females perform similarly on the science literacy assessment (figure 15; tables A3.14, A3.18, and A3.19).

- In the United States, parents' education is strongly linked to differences in student performance in reading, mathematics, and science literacy (figure 16; tables A3.20, A3.21, and A3.22).

- In the United States, increases in socioeconomic status are associated with increases in scores for reading literacy, mathematics literacy, and science literacy. Most participating countries do not differ significantly from the United States in terms of the strength of the relationship between socioeconomic status and literacy in any subject (figure 17; table A3.23).

- In the United States, parents' national origin is linked to performance in reading literacy and mathematics literacy only for those students with two foreign-born parents compared with students with two native-born parents. There was no difference in science literacy achievement between students with native and foreign-born parents (figure 18; tables A3.24, A3.25, and A3.26).

- In the United States and most other countries, the reading literacy achievement of students who speak the test language at home is higher than that of students not speaking this language at home. The United States and most other countries also show advantages for test-language speakers in mathematics and science literacy (figure 19; tables A3.27, A3.28, and A.3.29).

- The pattern of between-group differences for racial and ethnic groups in the United States is identical across the three literacy areas. In reading, mathematics, and science, the average literacy scores for Whites and "other" students are higher than for Hispanic and Black students (figure 20; table A3.30).

In the United States and many other countries, policymakers are not only interested in overall achievement, but also in achievement by specific population groups. The preceding chapters have discussed differences in student performance, but not differences among students themselves and how these might relate to performance. This chapter focuses on the performance of various demographic groups within the population of students aged 15 years in each participating country. Differences in reading, mathematics, and science literacy are presented for gender, parents' education, socioeconomic background, parents' national origin, and language spoken at home. Countries differ not only in average performance, but also in the performance of these population groups, and in the extent to which these groups differ from each other. In addition, this chapter presents performance results for PISA 2000 by race and Hispanic origin for the United States.

GENDER

Equity between males and females in educational opportunity is an important education policy goal in OECD countries, since it can have far-reaching consequences for economic opportunities and quality of life. Patterns of gender differences in student achievement by subject matter and across countries can point to areas of strength and weakness within educational systems seeking to provide equal access to learning for both males and females.

Previous studies have shown that, on average, females tend to perform better on reading assessments, and males tend to perform slightly better in mathematics and science, particularly at higher grade levels (Donahoe et al. 2000; Braswell et al. 2001; Mullis et al. 2000; Gonzales et al. 2000). Gender differences in mathematics and science achievement are more variable than in reading achievement across assessments, countries, and grades (Elley 1992, Mullis et al. 2000). The Third International Mathematics and Science Study (TIMSS) found a gender gap favoring males in mathematics and science achievement in more countries among eighth-graders than among fourth-graders, and the differences were more pronounced in eighth grade (Mullis et al. 2000).

The differences between the assessment scores of males and females for each country in each of the three subjects assessed by PISA are shown in figure 15. A bar extending under the females' side of the center divide indicates that females outperform males in that country, and vice versa. The size of the bar represents the difference in score points between males and females. The color of the bar indicates whether this difference is statistically significant: a dark bar indicates a significant difference; a light bar does not. For example, on the combined reading literacy scale in Australia, females outperform males by over 30 points on average, and that difference is statistically significant.

On the combined reading literacy scale, females outperform males in each of the 31 nations for which results are presented here. With few exceptions, the same holds true for performance on the three process subscales on the reading assessment *(retrieving information, interpreting texts,* and *reflecting on texts;* data not shown, see tables A3.15, A3.16, and A3.17).[16]

The size of the difference between females and males in reading literacy in the United States is similar to that of most other OECD nations, with the exception of Finland, where the gap on the combined reading literacy scale is larger than that of the United States. Finland's gender gap is greater than that of the United States not only on the combined reading literacy scale but in each of the three reading process subscales as well (data not shown; see tables A3.15, A3.16, and A3.17). The difference between combined reading literacy scores for males and females in Finland is 51 points, and the difference in the United States is 29 points. In addition, the gap between females'

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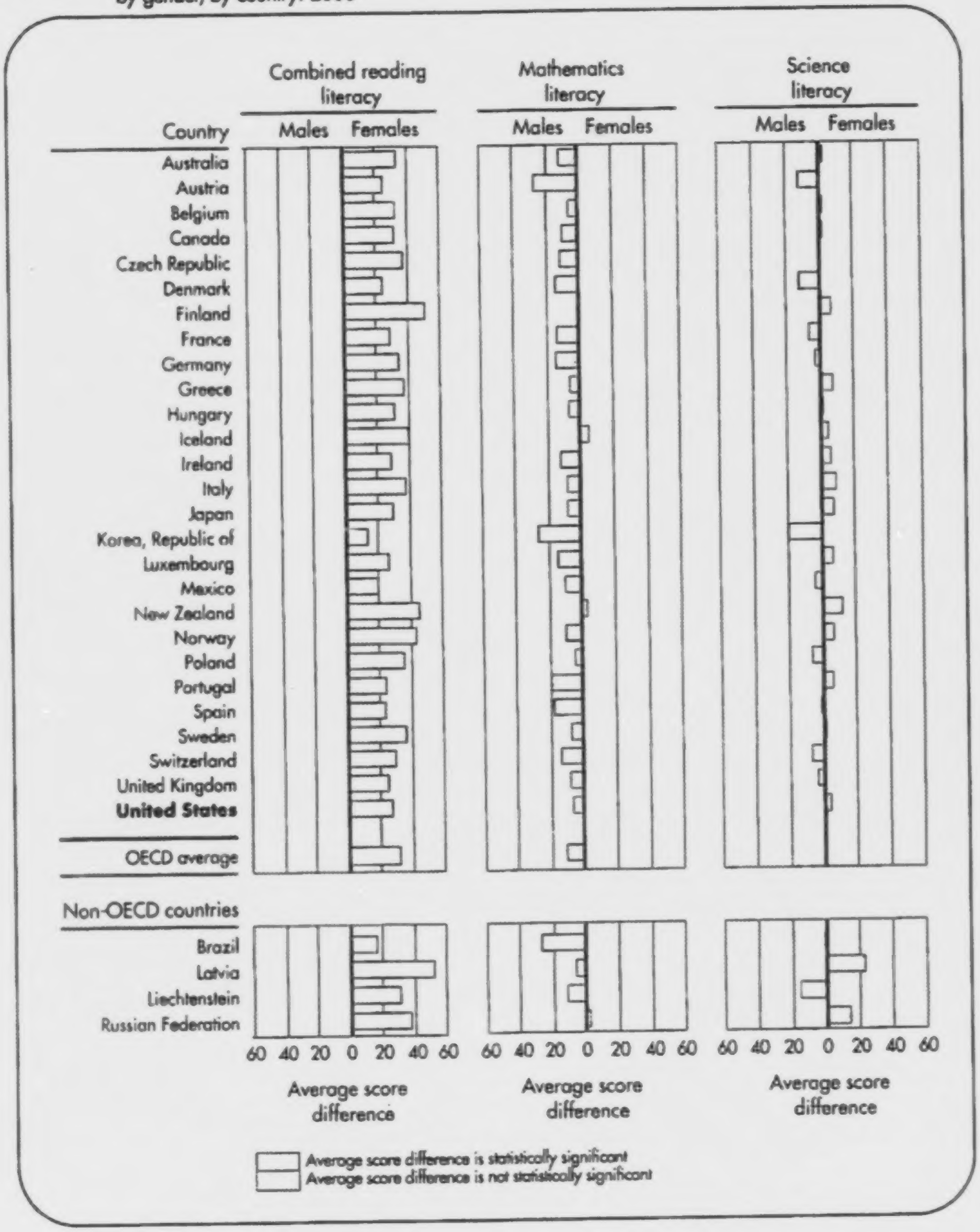
[16] In Brazil, Liechtenstein, and Mexico the gender difference is not significant for the *retrieving information* dimension, and for Korea the difference for *interpreting texts* is also not statistically significant.

Figure 15.—Differences in average scores in reading, mathematics, and science literacy of 15-year-olds by gender, by country: 2000



NOTE: Each bar above represents the average score difference between males and females on combined reading, mathematics or science literacy. Some of these differences are statistically significant and indicated by darker bars. For instance, the United States has a 29 point score difference favoring females in combined reading literacy, which is statistically significant. The score differences between U.S. males and females in mathematics literacy and science literacy are 7 points and 5 points, respectively, but neither is a statistically significant difference. Average score difference is calculated by subtracting scores of males from scores of females. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

and males' performance for *reflecting on texts* is higher in Iceland and Norway than in the United States. Among non-OECD nations, Latvia has a gender gap that is larger than that of the United States for the combined reading literacy scale and for the *interpreting texts* scale and the *reflecting on texts* scale.

On the PISA 2000 mathematics literacy assessment, performance of males and females in the United States is similar, as it is in 16 other countries. Fourteen countries show higher performance for males than females. The size of the gender difference in the United States is not different than that of other countries.

For most countries, including the United States, males and females perform similarly on the science literacy assessment. However, in Austria, Denmark, and Korea, males outperform females. In Latvia and New Zealand, females outperform males.

PISA 2000's findings for males and females in mathematics for the United States, in which males and females perform similarly, are generally consistent with the findings of other studies of these subjects such as NAEP and TIMSS, despite differences in frameworks and in some cases age of students assessed (Braswell et al. 2001; Mullis et al. 2000; Gonzales et al. 2000). NAEP, TIMSS, and TIMSS-R do, however, show differences in performance for science achievement of eighth-grade males and females that PISA 2000 does not.

PARENTS' EDUCATION

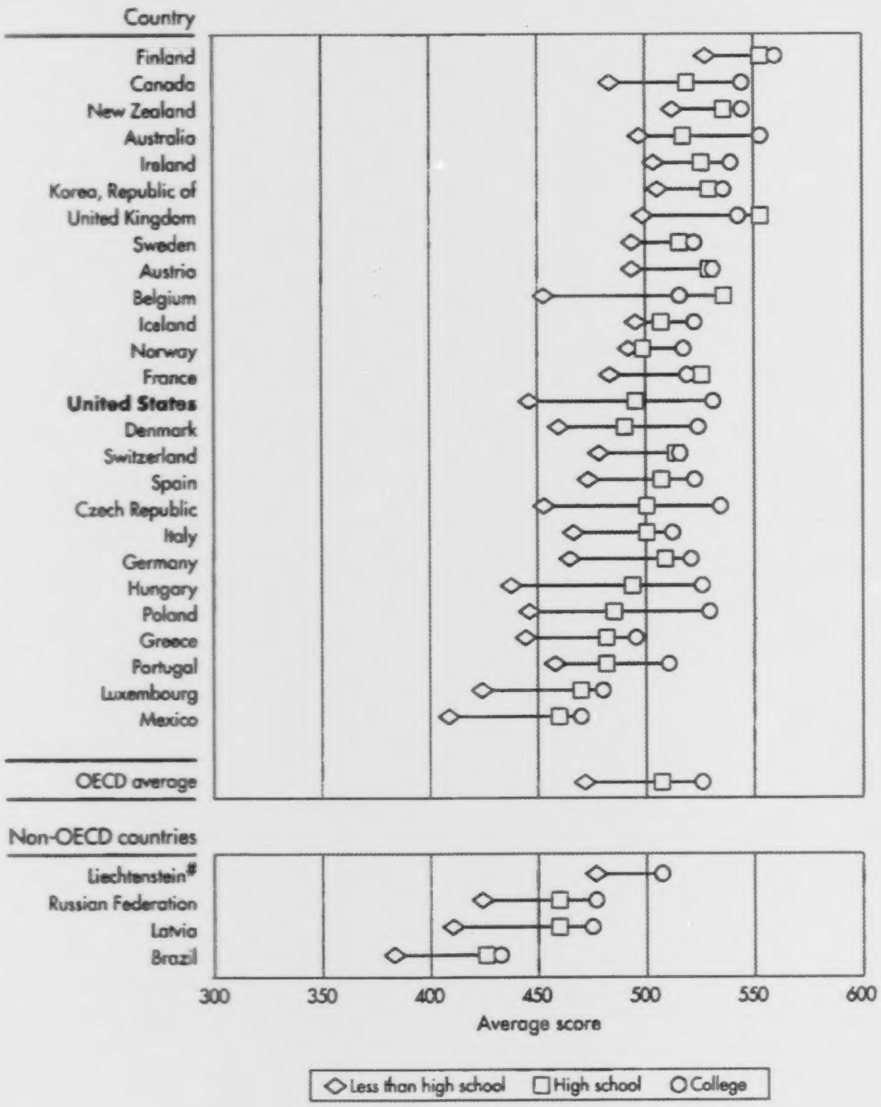
Students with more highly educated parents tend to perform better on assessments, as shown for instance in NAEP and TIMSS (Braswell et al. 2001; Gonzales et al. 2000). Research has shown that more highly educated parents are able to create enriched environments at home in which students are exposed to reading materials and other educational stimuli. More highly educated parents are also more likely to be involved in and show interest in their child's school, to help with homework, and to have higher expectations for their child's performance in school, all of which can influence student performance on assessments (Hernandez 1993). Parents' education is an important student background factor that may be especially influential on assessments of everyday literacy, such as PISA, since the acquisition of everyday literacy is less dependent on school curricula than skills that are gained almost exclusively through schooling, such as knowledge of specific mathematical formulas, for instance. The range of student performance on PISA according to the educational level of their parents can provide important information about the relative influence of parents' education on students' literacy performance across countries.

In the PISA 2000 background questionnaire, students are asked whether their parents have less than a high school diploma, a high school diploma, or a college degree. The highest level of education attained by either parent as reported by the participating 15-year-old is used in this analysis. Figure 16 (table A3.20) displays average scores on the PISA 2000 combined reading literacy scale for students in each country, grouped according to the level of education of their parents. The results for mathematics and science literacy show a similar pattern, and are therefore not shown to avoid repetition.

It can be seen from the distance between the average scores that parents' education has a strong relationship to reading literacy. In all of the 29 countries with data except Norway, students whose parents have less than a high school education perform at lower levels than students whose parents have a high school degree. In all countries, students whose parents have less than a high school education perform less well than those whose parents have a college degree. In 13 countries, students whose parents have a high school degree perform less well than those with a college degree, but in 15 other countries, there is no difference in scores between these two groups. In Belgium, students whose parents have a high school diploma score *higher* than those whose parents have a college degree.

In the United States, there is a 93 point gap in performance between students whose parents went to college and those whose parents have

Figure 16.—Differences in combined reading literacy scores of 15-year-olds by parents' level of education, by country: 2000



[#] Data for country in one or more reporting categories are too small to report.

NOTE: The points on each line displayed above represent the national averages for students based on the highest level of education attained by one or both parents: parents with less than a high school diploma, parents with a high school diploma, and parents who graduated college. For example, U.S. students whose parents graduated college averaged a score of 536 in reading literacy compared to 497 for students with parents who held only a high school diploma, and 443 for students whose parents possess less than a high school diploma. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

not completed high school on the combined reading literacy scale. No other country has a larger point difference. Norway, in contrast, shows a 28 point difference for the same two groups of students.

In mathematics literacy, student performance is higher in all countries among students whose parents completed college than among those whose parents did not complete high school (data not shown; see table A3.21). The gap between these two groups' performance is 99 points in the United States and 20 points in Norway. Comparisons of student performance by the other levels of parents' education yield more of a mixed picture. In most countries, including the United States, there is a difference in the mathematics literacy of students whose parents have not completed a high school degree and those who have. About half of the countries (14), including the United States, show a difference between the scores of students whose parents have completed high school and those whose parents have completed college.

Science literacy follows similar patterns as described above (data not shown; see table A3.22). In science literacy, Sweden is the only country in which students whose parents do not have a high school degree and those who do score similarly. In 12 of the 29 countries with data, including the United States, students with college-educated parents score higher than those with parents who have completed high school. In the United States, there is a difference of 96 points between the performance of students whose parents have not completed high school, and those whose parents have completed college. The size of that difference is similar to ten other countries, or about a third of the countries with data. By contrast to the United States, in Sweden, the gap between the scores of those same groups of students is 31 points.

The level of parents' education, then, varies somewhat in its relationship to literacy across countries, but in the United States, it is strongly linked to differences in student performance in reading, mathematics, and science literacy. Students whose parents complete college show a clear advantage over students whose parents do not, and particularly over those whose parents have not completed high school.

SOCIOECONOMIC STATUS

The socioeconomic status of students' parents consistently has been found to be among the strongest student background characteristics that influence student outcomes in the United States, including performance on assessments (Coleman et al. 1966; West, Denton, and Reaney 2000; Williams et al. 2000). The measure of student's socioeconomic status used in PISA 2000 is based on the occupation of the student's father and/or mother as reported by the student.[17] This in turn is transformed into an International Socioeconomic Index (ISEI) developed by Ganzeboom, De Graaf, and Treiman (1992), which allows direct comparisons between nations. The ISEI is keyed to the International Standard Classification of Occupations (ISCO).[18]

Students are assigned numbers ranging from about 16 to 90 on the index based on their parents' occupations, so that they are arrayed on a continuum from low to high socioeconomic status, rather than placed into discrete categories.[19] The linkage of socioeconomic status to literacy scores is shown as the relationship between the two, rather than a difference between group averages. Each one-point increase in the ISEI is associated with a specific increase in literacy scores, on average, for each country. The greater this increase in literacy scores in a country, the stronger the relationship between socioeconomic status and literacy scores is in that country.

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[17] The measure is based on the student's report of father's occupation, except in cases where information on father's occupation is missing. In those cases, mother's occupation was used if available. The OECD international report on PISA 2000, *Knowledge and Skills for Life—First Results from the OECD Programme for International Student Assessment*, bases its ISEI measure on the highest of the father's or mother's occupation.

[18] For details on the construction of this index see Ganzeboom, H., De Graaf, P., and Treiman, D. (1992) and Ganzeboom, H., and Treiman, D. (1996).

[19] See footnote 17. The range of ISEI scores given for the 1988 ISCO occupations listed in Ganzeboom and Treiman (1996) goes from 16, the lowest (agricultural laborer), to 90, the highest (judge).

Figure 17 (page 44; table 3.23) displays the relationship of socioeconomic status to reading, mathematics, and science literacy scores for each participating country. For each country, the relationship between the ISEI and the literacy score is indicated in the table. For example, in the United States each point difference on the ISEI scale is associated with a 2.1 point difference in reading literacy on average. In Japan, socioeconomic background differences in achievement are at a minimum—a one-point difference in ISEI is associated with less than a one-point difference in literacy. By contrast among students in the Czech Republic, Germany, or Hungary, a one-point difference in ISEI is associated nearly a 3 point difference in literacy.[20] An ISEI difference of 50 points is roughly equivalent to the difference in socioeconomic status in the United States between a medical doctor and a motor vehicle mechanic, or an architect and a garbage collector (Ganzeboom and Treiman 1996, appendix A). This 50-point ISEI difference would translate to a score difference of approximately 105 points in reading—more than one level on the literacy scale.

Within any one country, the relationship between socioeconomic status and literacy for each subject may vary. In the United States, the relationship of socioeconomic status to literacy levels is about the same for each subject. By contrast, in France, the relationship of socioeconomic status to literacy varies according to whether that literacy is reading, mathematics or science.

In every subject area, Finland, Iceland, Japan, Korea, and Latvia have a smaller relationship between ISEI and average scores than does the United States. That is, average scores are less affected by a student's socioeconomic background in these countries than they are in the United States. For example, the size of the relationship of socioeconomic background to reading literacy achievement is smaller in Finland, Iceland, Japan, Korea, and Latvia than in the United States. The same countries have smaller relationships between ISEI and average scores in science literacy than the United States does. For mathematics literacy, in addition to those same countries, Canada and Italy also have relationships of ISEI to average scores that are smaller than the relationship in the United States.

There is only one case in which the size of a country's relationship between ISEI and average scores is greater than that in the United States, in Germany for reading literacy. This means that socioeconomic background is associated with a larger change in average scores for reading literacy in Germany than in the United States. In every other case, the size of the relationship between socioeconomic background and average scores in the United States is similar to other countries. Out of 31 countries, the United States has a similar relationship of ISEI to average scores to 24 countries in reading literacy, 23 countries for mathematics literacy, and 25 countries for science literacy.

In short, although a few countries show consistently smaller relationships of socioeconomic background to average scores than does the United States, most of the participating countries do not differ from the United States in terms of the size of the relationship between socioeconomic status and the literacy of their 15-year-olds as measured by PISA 2000.

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[20] Since the ISEI index has a range of 74 points (from 16 to 90), in Japan students with the lowest positions on the socioeconomic index would differ from those with the highest socioeconomic index positions by about 37 points. In the same way, students with the lowest positions on the socioeconomic index in Germany, the Czech Republic, or Hungary would differ from those with the highest by about 192 points, or close to two standard deviations, a substantial difference.

Figure 17.—Relationship between parents' socioeconomic status and combined reading literacy, mathematics literacy, and science literacy scores, by country: 2000

	AVERAGE SCORE POINT INCREASE WITH A ONE UNIT INCREASE ON THE ISEI INDEX		
Country	**Combined reading literacy**	**Mathematics literacy**	**Science literacy**
Australia	1.9	1.8	1.6
Austria	2.2	1.9	2.1
Belgium	2.3	2.3	2.5
Canada	1.6	1.3	1.4
Czech Republic	2.7	2.6	2.6
Denmark	1.8	1.5	2.0
Finland	1.3	1.2	1.1
France	1.9	1.6	2.1
Germany	2.8	2.4	2.5
Greece	1.7	1.9	1.6
Hungary	2.4	2.6	2.7
Iceland	1.2	1.0	0.8
Ireland	1.9	1.6	1.8
Italy	1.6	1.3	1.5
Japan	0.4	0.6	0.5
Korea, Republic of	0.9	1.3	1.2
Luxembourg	2.4	2.0	2.0
Mexico	1.9	1.8	1.6
New Zealand	2.0	1.9	1.9
Norway	1.8	1.6	1.6
Poland	2.2	2.2	2.0
Portugal	2.4	2.1	2.0
Spain	1.6	1.7	1.9
Sweden	1.7	1.9	1.5
Switzerland	2.5	2.1	2.5
United Kingdom	2.4	2.1	2.3
United States	2.1	2.2	2.1
OECD average	2.1	2.0	2.0
Non-OECD countries			
Brazil	1.6	2.0	1.6
Latvia	1.3	0.9	1.2
Liechtenstein	2.0	1.4	2.2
Russian Federation	1.6	1.5	1.5

NOTE: Socioeconomic status is measured by the International Socio-Economic Index (ISEI), a measure based on the occupations of the student's parent(s). The measure used in these analyses was based on the parent with the highest ISEI. Students can be placed anywhere from about 16 to 90 on the ISEI index. The numbers shown in the table indicate the strength of the relationship between the socioeconomic status and literacy in each of reading, mathematics and science. Each number is interpreted as follows: a one-unit difference in ISEI is associated with an n-unit difference in literacy, where 'n' is the number shown in the table. Thus, the larger the number, the greater the association between socioeconomic status and literacy. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

PARENTS' NATIONAL ORIGIN

Children who are foreign-born or who are children of foreign-born parents face challenges during the process of acculturating and adjusting to a new country, and their achievement in school and general literacy may suffer accordingly (Lollock 2001). Other OECD countries as well as the United States are home to large populations of children whose parents are foreign-born, and it has become an important goal in these countries to prevent the social exclusion of these children from educational and economic opportunity. In the United States, 14 percent of students have both parents born outside the United States.[21] Australia, Canada, Latvia, Liechtenstein, Luxembourg, New Zealand, and Switzerland all have 20 percent or more students with two foreign-born parents. The Czech Republic, Finland, Italy, Iceland, Japan, Poland, and Brazil, in contrast, have 1 percent or less of their students with two foreign-born parents (table A3.24).

Figure 18 (page 46) presents the reading literacy of students in each country by whether their parents were born in that country. The categories are: both parents are born in the country; one parent is native-born and one parent is foreign-born; and both parents are foreign-born.

In the United States and 18 of the 26 other countries with data, students with two foreign-born parents score lower on the combined reading literacy scale than students with two native-born parents. For example, in Belgium, the difference between groups is almost 109 points, while in the United States it is a 40 point gap. Belgium, Germany, Luxembourg, and Switzerland have significantly larger differences between these two groups than the United States. Likewise, in all but six countries, students with two foreign-born parents score lower than those with one native-born and one foreign-born parent. The difference in performance between these two groups in the United States is not significant. In most countries (22 of the 29 countries with data), including the United States, there is no difference between the reading literacy achievement of students with two native-born parents and those with one foreign-born and one native-born parent.

In mathematics literacy, fewer countries have a gap in performance between students with foreign-born parents and the other two groups of students (data not shown; see table A3.25). In 15 of the 26 countries with data, or about half of the PISA 2000 participating countries, including the United States, the difference between students with two foreign-born parents and students with two native-born parents is significant. For the U.S., this gap is about 40 points. There are no differences in the United States between students with two foreign-born parents and those with one native-born and one foreign-born parent, or between students with one native-born and one foreign-born parent and students with two native-born parents. These results suggest that the acquisition of mathematics skills is less influenced by parents' place of birth than is the acquisition of reading skills.

Science literacy varies less by parental nativity than reading literacy, but more than mathematics literacy (data not shown; see table A3.26). In 17 of the 26 countries with data, but not the United States, students with two foreign-born parents perform at lower levels in science literacy than students with two native-born parents. Fifteen-year-olds with one native and one foreign-born parent also outperform students with two foreign-born parents in 17 countries. In only four countries do students with one foreign-born and one native-born parent score differently than those with two native-born parents. In the United States, there is no difference in science literacy by parental nativity.

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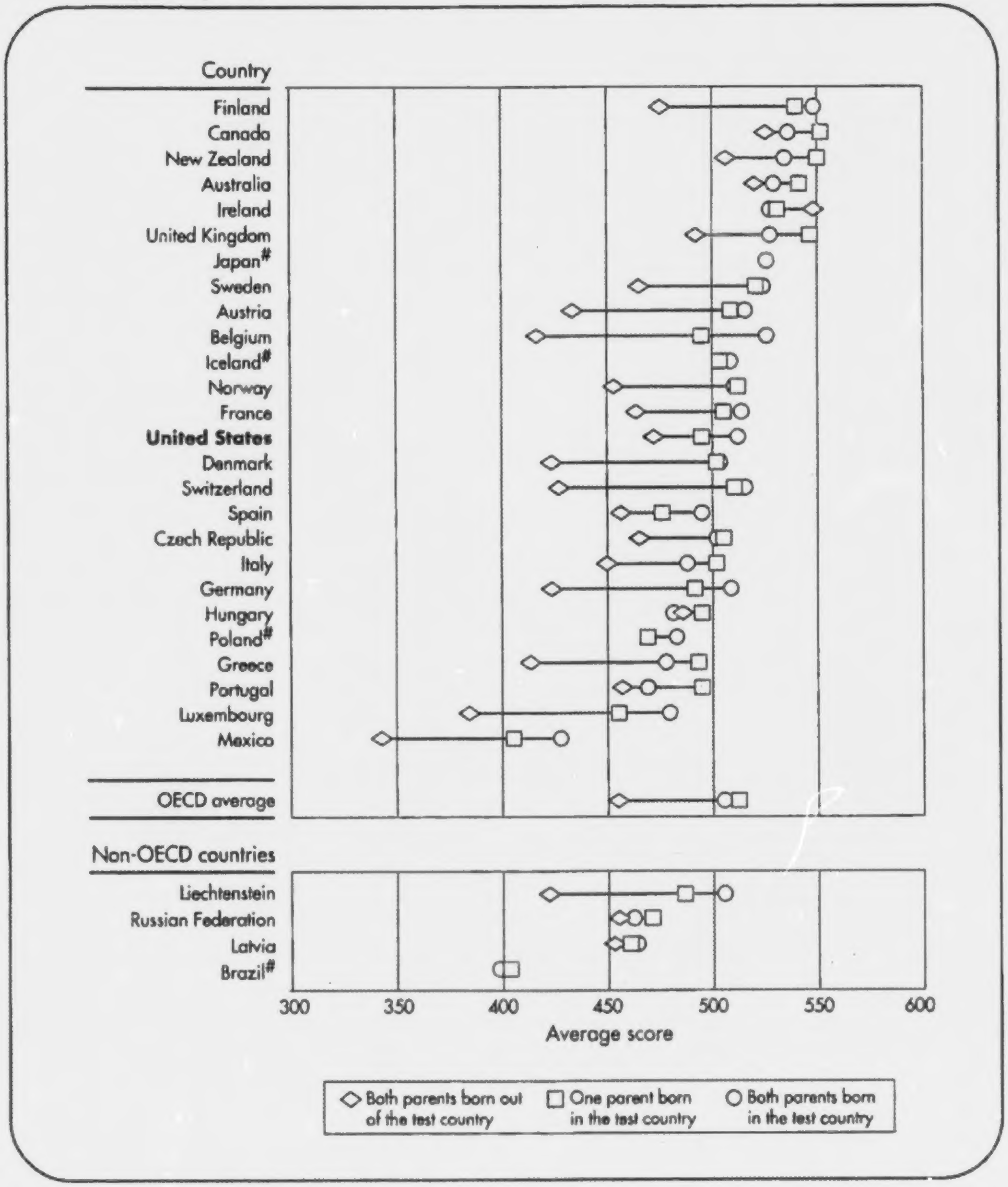
[21] Percentages are for the reading literacy part of the assessment; there are small differences in the percentages reported for reading literacy, mathematics literacy, and science literacy because of slight differences in the numbers of students taking each part of the assessment. For example, in the United States percentages reported for students with both parents born outside the country are 14 percent for reading literacy and science literacy and 13 percent for mathematics literacy.

Figure 18.—Differences in combined reading literacy scores of 15-year-olds by parents' national origin, by country: 2000



#Data for country in one or more reporting categories are too small to report.

NOTE: The points on each line displayed above represent the national averages for students based on their parents' national origin: students with both parents born in the test country, students with one parent born in the test country, and students with parents both born outside of the test country. For example, U.S. students whose parents were born in the United States averaged a score of 512 in reading literacy compared to 494 for students with one parent born in the United States, and 472 for students whose parents were born outside of the United States. Data for the Republic of Korea are not available. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 26 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

LANGUAGE SPOKEN AT HOME

Over the last two decades, the percentage of students in U.S. schools speaking a language other than English at home has more than doubled to 17 percent in 1999 (Federal Interagency Forum on Child and Family Statistics 2001). These students may face greater challenges progressing in school and in the labor market, once they leave school (Federal Interagency Forum on Child and Family Statistics 2001). The United States is not unique in this respect. Other OECD nations are also educating students whose first language is not the language of instruction in the country and/or who speak another language at home.

Students who speak a language at home other than the language in which the assessment is given may be more likely to lack a facility in the language of the assessment, which could affect performance in reading, mathematics, and science literacy. In PISA 2000, students were asked what language they speak at home most of the time—the language of the assessment, English, or another language.[22] Two countries, Hungary and Korea, do not report information for this question. One other, Japan, has numbers of students reporting speaking a language other than Japanese that are too small to reliably estimate scores for that group. The percentage of students who respond that they speak the test language most of the time at home ranges from 69 percent in Canada to 99 percent in Brazil. In the United States, 89 percent of students report that they speak the language of the assessment (English) at home most of the time (table A3.27).[23]

Dividing students into two categories—those who speak the test language at home most of the time, and those who do not—allows a comparison of their performance. Achievement differences between these two groups are shown in figure 19 (tables A3.27, A3.28, and A3.29) for reading, mathematics, and science literacy in each of the participating nations.

In most countries, there is a gap in reading achievement for students who speak a language other than the assessment language at home. Except for Brazil, the Czech Republic, Ireland and Spain, the reading achievement of students who speak the test language at home is higher than that of students not speaking this language at home. The size of the difference is similar to that of the United States for most countries; however, Australia, Belgium, and Canada show a smaller achievement difference than the difference between these groups of students in the United States.

The second graph in figure 19 (page 48) displays the differences in performance for mathematics literacy by the language spoken in the home. Again, students who speak the language of the test show an advantage in most countries. Nineteen of the 28 nations that report results show an advantage for test-language speakers in mathematics literacy, including the United States. In two countries, Canada and Spain, the difference favors students who do not speak the language of the test at home "most of the time." Six countries (Australia, Belgium, Canada, Finland, Italy, and Spain) have smaller achievement differences in mathematics literacy between students who speak the test language and those who do not than does the United States. The U.S. difference between test and non-test language speakers is larger than the OECD average difference for mathematics literacy.

The third graph in figure 19 displays the differences between the two language-defined groups in science literacy achievement. As in the case of reading and mathematics, the findings point to an advantage in speaking the language

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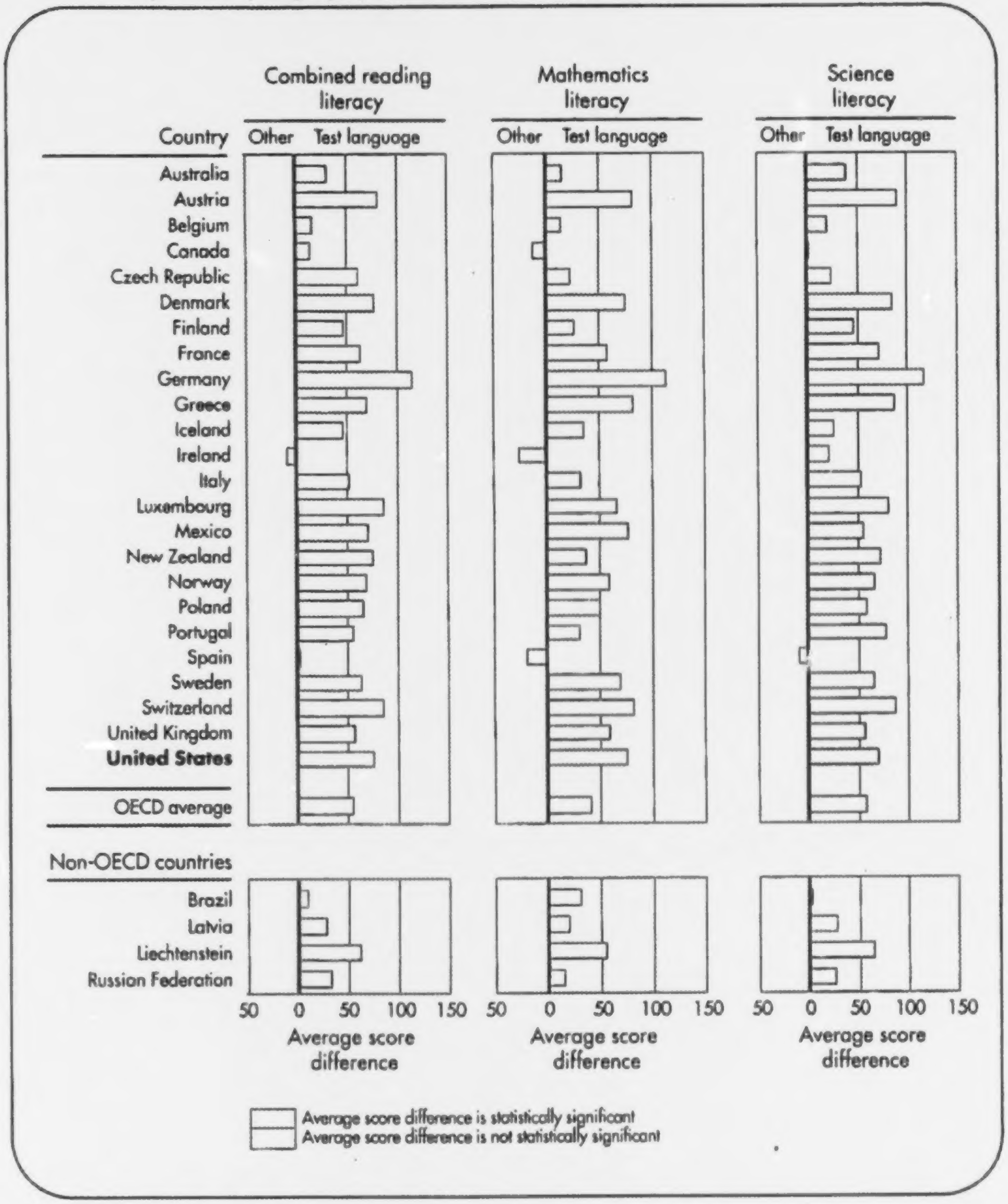
[22] Other PISA countries included response options for students to choose an official national language or a national dialect. In this report, for these countries, all these responses are grouped as languages other than the test language.

[23] See footnote 21.

Figure 19.—Differences in combined reading literacy, mathematics literacy and science literacy scores of 15-year-olds by language spoken at home, by country: 2000



NOTE: Each bar above represents the average score difference on combined reading, mathematics or science literacy between students who speak the test language at home and those who speak another language. Some of these differences are statistically significant and indicated by darker bars. For example, in the United States, students who speak English at home outperform students who speak another language at home in all three subject areas. These score differences are 76 points in combined reading literacy, 73 points in mathematics literacy and 68 points in science literacy. Data for Hungary and the Republic of Korea are not available. Data for Japan on students who speak other languages at home are too small to report, and therefore, data for Japan are not presented. Average score difference is calculated by subtracting the average score for those who speak other languages at home from average scores for those who speak the test language at home in each country. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 25 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

of the test. In 21 of the 28 nations that report results for this question, including the United States, test-language speakers perform better than speakers of other languages. The remaining countries show no differences in performance for science literacy. Belgium has a smaller difference between these groups than the United States does.

Overall, while there is some variability among countries in this respect, in the United States and in most other countries, the language that students speak at home is linked to their performance on PISA 2000's reading, mathematics, and science literacy assessments.

RACE AND HISPANIC ORIGIN

Differences in performance by race and Hispanic origin on the National Assessment of Educational Progress (NAEP) have been documented for more than two decades (Campbell et al. 1996). White students tend to score higher on assessments than Blacks and Hispanics.[24] This same pattern emerges from the U.S. components of international assessments as well (Binkley and Williams 1996; Gonzales et al. 2000). A substantial amount of research addresses these between-group differences, focusing on social and economic background, differences in quality of social and educational environments, and inequality of opportunity brought on by direct and indirect discriminatory practices (Wilson 1996; Hedges and Nowell 1999).

Racial and ethnic groups vary between countries, so it is not possible to compare their performance across countries on international assessments. Thus this section refers only to findings for the United States. Students' race and Hispanic origin is obtained through student responses to a two-part question. Students are asked first whether they are Hispanic, and then asked whether they are members of the following racial groups—American Indian/Alaska Native, Asian, Black or African American, Native Hawaiian or Pacific Islander, or White. Multiple responses are allowed so students can be identified as multiracial. Students identifying themselves as Hispanic and also Black or White are included in the Hispanic group. Because of small numbers of students, all identifications other than the three major groups of White, Black, and Hispanic are grouped as "other." This includes multiracial students. Comparisons among these four groups are presented for reading, mathematics, and science literacy using these categories.

Figure 20 (page 50; table A3.30) displays the average performance levels of U.S. 15-year-olds in reading, mathematics, and science literacy for each of the four identified racial and ethnic groups. The chart presents a comparison of each group by each other group. Average scores for each group appear to the right of the chart. The letters in the chart indicate (by the first letter of the word for the group) differences in achievement between groups being compared. In reading literacy, for example, Whites outperform both Hispanics and Blacks.

Figure 20 makes it clear that the pattern of between-group differences is identical across the three literacy areas. In reading, mathematics, and science, the average literacy scores for Whites and other students are higher than for Hispanic and Black students. This pattern of performance on PISA 2000 by race and Hispanic origin is similar to that on NAEP and other assessments (Campbell et al. 1996).

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[24] Whites refers to non-Hispanic Whites and Blacks to non-Hispanic Blacks.

Figure 20.—Comparisons of reading, mathematics and science literacy average scores of U.S. 15-year-olds, by race/ethnicity: 2000

Combined reading literacy

	White	Other	Hispanic	Black	Student group average
White students			W	W	538
Other students*			⊙	⊙	504
Hispanic students	W	⊙			449
Black students	W	⊙			445

Mathematics literacy

	White	Other	Hispanic	Black	Student group average
White students			W	W	530
Other students*			⊙	⊙	495
Hispanic students	W	⊙			437
Black students	W	⊙			423

Science literacy

	White	Other	Hispanic	Black	Student group average
White students			W	W	535
Other students*			⊙	⊙	510
Hispanic students	W	⊙			438
Black students	W	⊙			435

W White students outperformed compared racial/ethnic group
⊙ Other students outperformed compared racial/ethnic group
☐ No significant score differences between compared groups

*The "other" group comprises students identifying themselves as American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander, or multiracial since numbers of these students are too small to report by individual categories.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2000.

SUMMARY

Just as the chapters on reading, mathematics, and science literacy began with a simple measure of average performance for a country and then presented additional information on how performance varies within and between countries, this chapter shows further variations in performance based on background characteristics of 15-year-olds. Most comparisons are both within and across nations, although comparisons by race and Hispanic origin are for the United States only. The next chapter will show some of the initial steps PISA has taken to measure general outcomes of learning such as attitudes toward learning and learning strategies, and will continue some of the discussion begun in this chapter about gender differences in learning outcomes.

Chapter 5

CROSS-CURRICULAR COMPETENCIES AND THE FUTURE OF PISA

Key Findings

- Thirty percent of U.S. 15-year-olds agree or strongly agree that reading is a favorite hobby, a lower percentage than the OECD average. Percentages range from 62 percent of students agreeing that reading is a favorite hobby in Mexico to 24 percent in Norway (figure 21; table A3.31).
- In every country, females agree more frequently than males that reading is a favorite hobby. Thirty-seven percent of females in the United States agree that reading is a favorite hobby, compared to 22 percent of males (figure 22; table A3.31).
- About half of U.S. 15-year-olds report trying to memorize as much as possible often or always when studying. The U.S. percentage in this case is higher than the OECD average, suggesting that a greater proportion of U.S. students often use memorization as a learning strategy than the average proportion of OECD country students (figure 23; table A3.32).
- The percentages of students who respond that they often or always try to relate new material to things they have already learned range from 15 percent in Italy to 90 percent in Hungary. Fifty-nine percent of U.S. students report using this strategy frequently, a higher percentage than the OECD average (figure 25; table A3.33).

One of PISA's main objectives is to measure student performance on general or nonacademic learning outcomes in addition to outcomes for reading, mathematics, and science literacy. These "cross-curricular competencies," or CCCs, will have a growing importance in PISA as it develops over time. The measurement of these kinds of competencies is part of PISA's mission to measure a variety of important knowledge and skills needed in adult life.

In 2003, for example, PISA will assess students' abilities to solve problems. Plans for PISA 2006 include the development of an assessment of students' abilities to use information and communications technologies.

As a first step toward the measurement of cross-curricular competencies, in PISA 2000, student questionnaire items sought information in two major learning areas, student attitudes toward learning and learning strategies. These data can be viewed both as an input for student learning as well as outcomes of students' school and life experiences up until the age of 15. For example, are certain kinds of learning strategies associated with higher performance in reading, mathematics, or science literacy? By the age of 15, what kind of learning strategies and what kinds of attitudes toward learning do students have? This chapter will present information on student reports for questions related to these topics, including some discussion of gender differences.[25]

Attitudes Towards Reading

Proficiency scores for reading literacy describe how well 15-year-olds can apply a variety of reading processes in different kinds of situations. They do not address, however, students' attitudes toward reading or how likely students are to apply their reading literacy skills. To develop a fuller picture of what 15-year-old students are like as learners, PISA 2000 also included a number of questions for students about their attitudes toward reading and math and time spent reading. Only information related to reading is discussed here.[26]

One indication of how students view reading and how important it is to them is the extent to which they read in their free time (figure 21). PISA 2000 asked students to provide information on this issue by rating the statement "Reading is one of my favorite hobbies."[27]

Thirty percent of U.S. students agree or strongly agree that reading is a favorite hobby, a lower percentage than the OECD average. Percentages range from 62 percent of students agreeing that reading is a favorite hobby in Mexico to 24 percent in Norway.

In the United States and in every other country, females agree more frequently than males that reading is a favorite hobby (figure 22, page 54; table A3.31). Thirty-seven percent of females in the United States agree that reading is a favorite hobby, compared to 22 percent of males. In a number of countries (Austria, Canada, Czech Republic, Finland, Germany, Ireland, Portugal, and Switzerland), the difference between males and females is greater than in the United States.

By the age of 15, greater proportions of young people in other OECD countries cite reading as a favorite pastime than in the United States. Why do greater percentages of non-U.S. students say this? Also, why do more females consider

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[25] Analysis of attitudes toward learning and learning strategies was limited to differences by gender for this initial report on PISA 2000 because of the restricted nature of the measures of the cross-curricular competencies discussed in this report. Differences for other population subgroups (such as racial or ethnic groups) could be analyzed in future reports or cycles of PISA.

[26] PISA 2000 created indices of interest in reading and mathematics from a series of student questions. Only an illustrative question is discussed here. For further information about these indices, see the PISA international report *Knowledge and Skills for Life – First Results from the OECD Programme for International Student Assessment* (OECD 2001).

[27] In interpreting these results, readers should keep in mind that these are students' own descriptions of their behaviors, and that differences in responses may be in part attributable to cultural differences or social norms in participating countries.

Figure 21.—Percentage of 15-year-olds who agree or strongly agree that reading is a favorite hobby, by country: 2000

Country	Percent
Mexico	62
Portugal	54
Czech Republic	52
Italy	45
Finland	41
Poland	39
Greece	37
Japan	36
Ireland	36
Spain	35
Switzerland	35
Korea, Republic of	35
Canada	34
New Zealand	33
France	33
Luxembourg	31
Australia	31
Denmark	31
Austria	30
United States	30
United Kingdom	30
Sweden	29
Hungary	29
Germany	29
Iceland	27
Belgium	26
Norway	24
OECD average	35
Non-OECD countries	
Brazil	49
Latvia	37
Liechtenstein	31
Russian Federation	43

■ Percentage is significantly higher than the U.S. percentage
☐ Percentage is not significantly different from the U.S. percentage
■ Percentage is significantly lower than the U.S. percentage

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

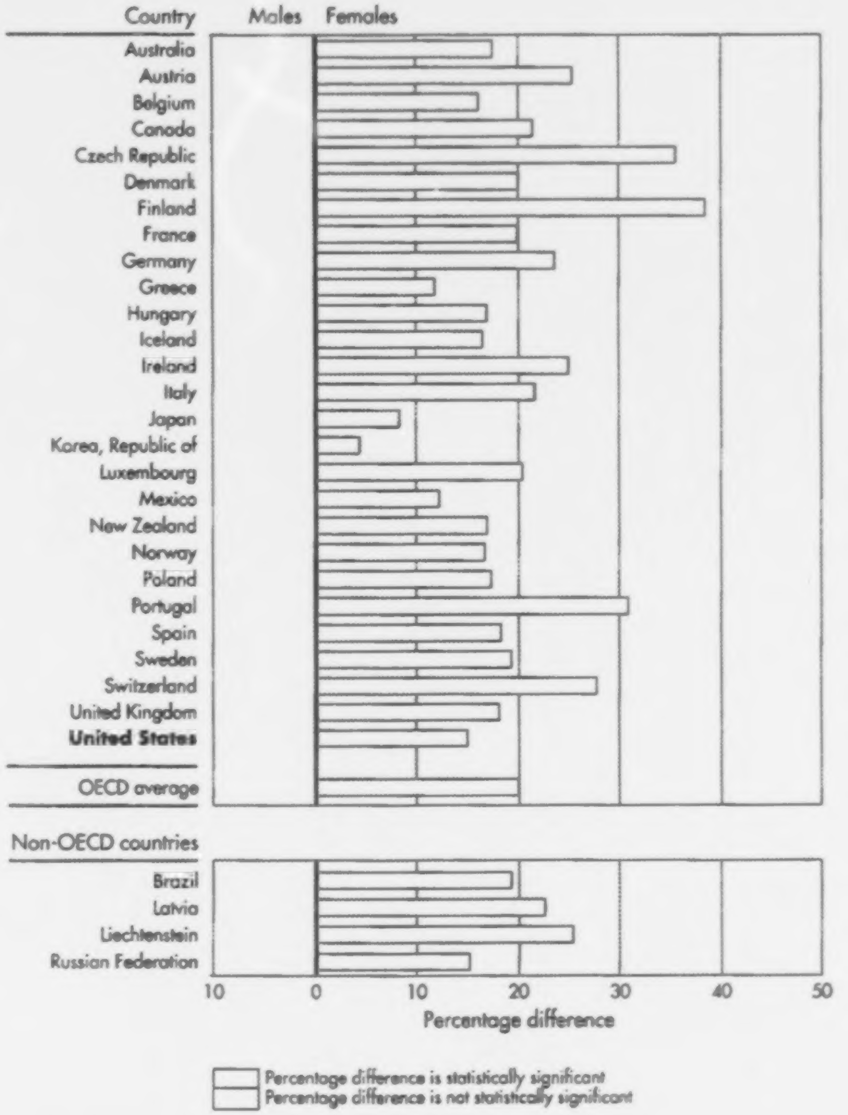
SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

reading a favorite hobby both in the United States and elsewhere? These data raise more questions than PISA 2000 alone can answer, but further study of this issue could hold lessons for schools, parents, and policymakers about reading.

LEARNING STRATEGIES

The idea of lifelong learning has become an important part of the educational landscape in the past few years. The notion is that formal

Figure 22.—Percentage differences by gender of 15-year-olds who agree or strongly agree that reading is a favorite hobby, by country: 2000



NOTE: Each bar above represents the difference in percentages of males and females in each country who agree or strongly agree that reading is a favorite hobby. These differences are statistically significant in every country and indicated by darker bars. For instance, in the United States, 15 percent more females than males agree or strongly agree that reading is a favorite hobby, a difference that is statistically significant. Average percentage difference is calculated by subtracting percentage of males who agree from percentage of females who agree. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

schooling cannot provide all of the knowledge and skills that people will need throughout their lives, and that people need to continue to learn (both formally and informally) for their own individual social and economic well-being and for the well-being of their societies. Acknowledging that students cannot learn everything they need for success in life in school, PISA recognizes that students must at least develop the prerequisites for successful learning. Research shows that these prerequisites are cognitive and motivational in nature and that several dimensions (i.e., beliefs, attitudes) are related to self-regulated learning (Baumert et al., 1998). The PISA instrument on self-regulated learning focused on three of these dimensions—learning strategies, motivation, and self-concept. The previous section touched upon motivation; this section focuses on learning strategies.

PISA 2000 provides initial information on the different strategies for learning that students report using. This information can provide some insight into how schools and societies have shaped young people's approaches to learning and how students see themselves as learners. Young people may take these approaches to learning with them into adulthood, and awareness of what learning strategies they use may help them to be successful learners in the future.

To collect this information, PISA 2000 offered participating countries a series of optional questions for students on their learning strategies. Questions related to learning strategies focused on several areas: control of learning, use of memorization and elaboration strategies, and the use of competitive or cooperative strategies for success. Only information related to the use of memorization and elaboration strategies is discussed here.[28]

To gauge students' use of memorization strategies when studying, PISA 2000 asked students to reply to the question "I memorize as much as possible" by choosing one of four possible responses: never, sometimes, often, or always.[29]

About half (49 percent) of U.S. 15-year-olds report trying to memorize as much as possible often or always when studying (figure 23, page 56). The U.S. percentage in this case is higher than the OECD average, suggesting that a greater proportion of U.S. students often use memorization as a learning strategy than the average proportion of OECD country students.

In the United States, about the same percentages of males and females (50 percent of females and 48 percent of males) say they often or always try to memorize as much as possible when studying (figure 24, page 57; table A3.32). Fourteen other countries (of the 25 countries reporting data) also have similar percentages of males and females reporting this strategy, but the remaining 10 other countries that report information on the use of memorization all have more males than females who say they use this strategy.

As a contrast to memorizing while studying, PISA 2000 also asked students to reply to the question "I try to relate new material to things I have already learned in other subjects," using the same response categories noted above for memorization: never, sometimes, often, and always. PISA 2000 considers this type of question as an indication of use of "elaboration" strategies.

Percentages of students who respond that they often or always try to relate new material to things they have already learned range from 15 percent in Italy to 90 percent in Hungary. Fifty-nine percent of U.S. students (figure 25, page 58)

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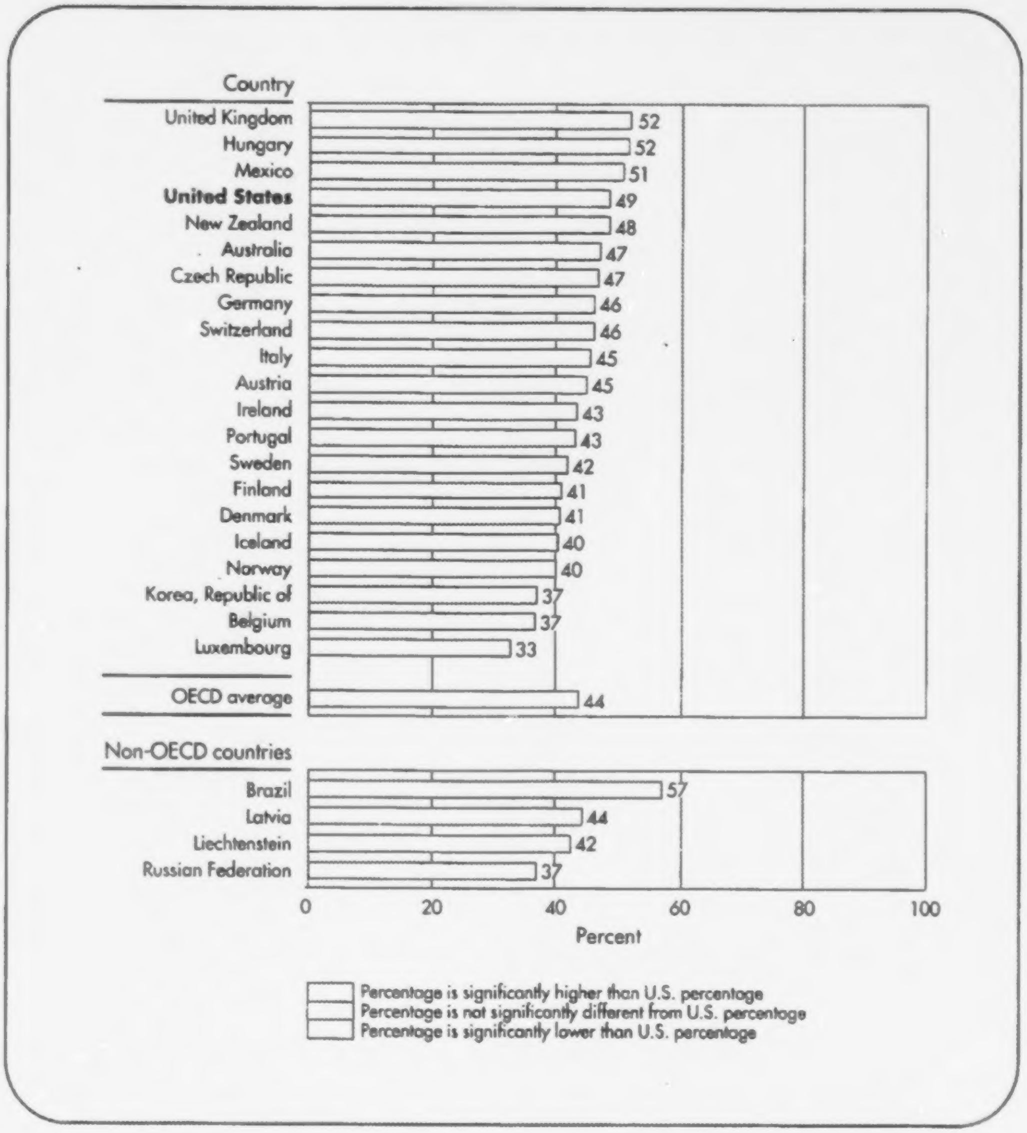
[28] Elaboration strategies refer to students' relating information they are trying to learn to things they already know or have learned, or trying to relate new things to real world situations. PISA 2000 created indices for memorization and elaboration from a series of student questions. Only responses to two illustrative questions are discussed here. For further information on learning strategies or other cross-curricular competencies, see the PISA international report *Knowledge and Skills for Life—First Results from the OECD Programme for International Student Assessment* (OECD 2001). An in-depth report on these topics is planned to be published in 2002.

[29] Questions on learning strategies were optional, and not all countries report data for this question. Canada, France, Greece, Japan, Poland, and Spain do not report results.

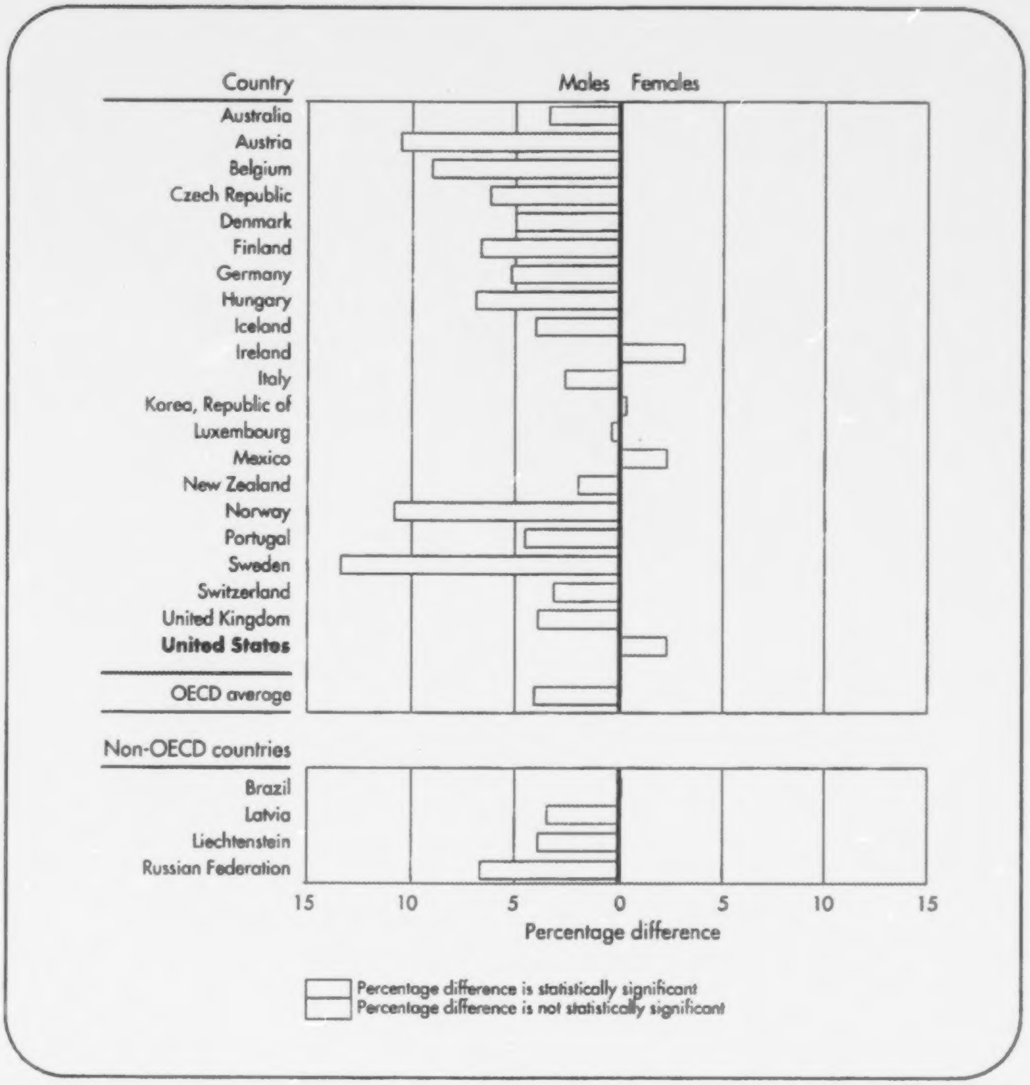
Figure 23.—Percentage of 15-year-olds who report memorizing often or always when studying, by country: 2000



NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 21 OECD countries. The other participating OECD countries did not collect data for this question. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

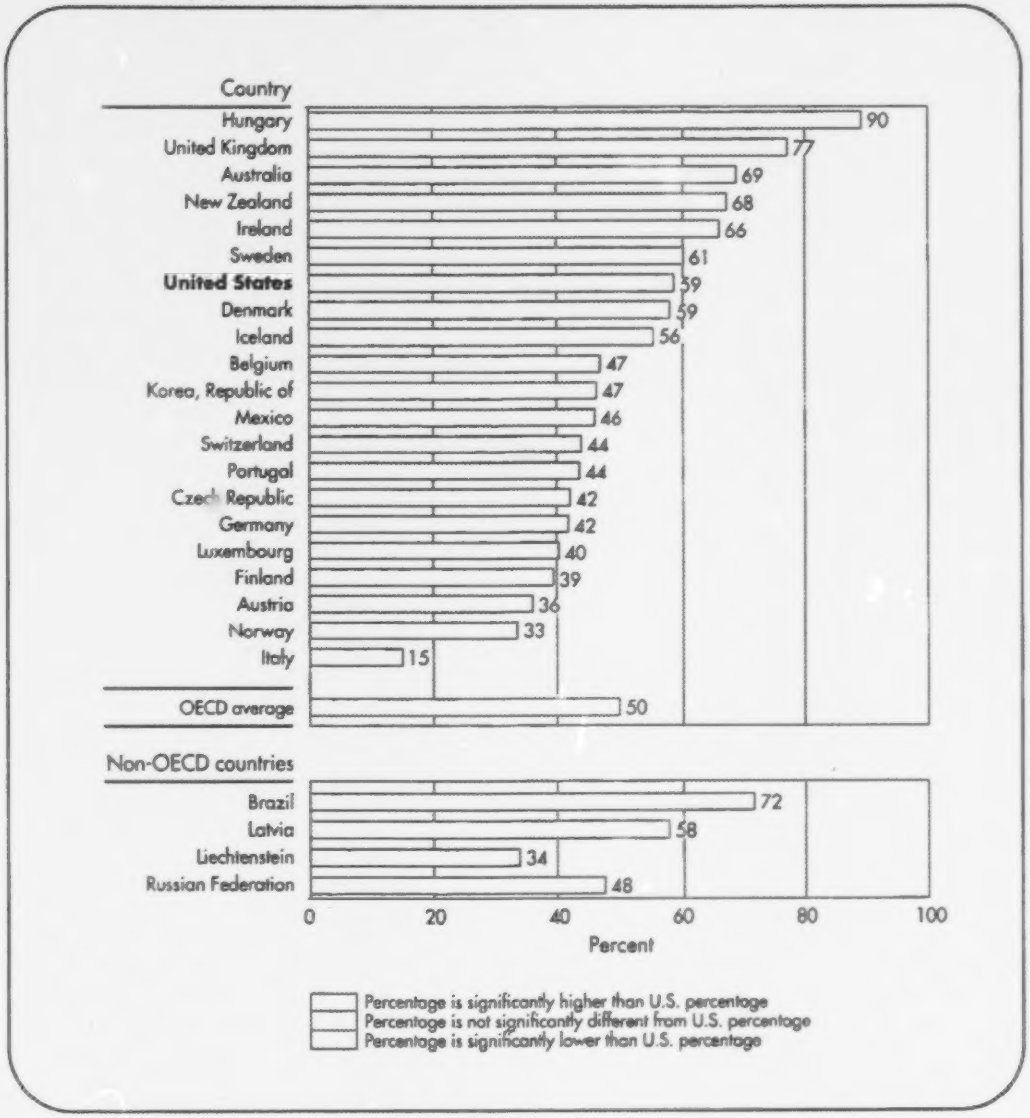
Figure 24.—Percentage differences by gender of 15-year-olds who report memorizing often or always when studying, by country: 2000



NOTE: Each bar above represents the difference in percentages of males and females in each country who say the use memorization often or always. Some of these differences are statistically significant and indicated by darker bars. In the United States, 2 percent more females than males state they use memorization often or always, a difference that is not statistically significant and indicated by a lighter bar. Average percentage difference is calculated by subtracting percentage of males who agree from percentage of females who agree. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 21 OECD countries. The other participating OECD countries did not collect data for this question. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Figure 25.—Percentage of 15-year-olds who report using an elaboration strategy often or always when studying, by country: 2000



NOTE: Elaboration refers to students' relating information they are attempting to learn to things they already know or have learned. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 21 OECD countries. The other participating OECD countries did not collect data for this question. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

report using this strategy frequently, a higher percentage than the OECD average.

Within the United States, a higher proportion of females (61 percent) than males (57 percent) say they frequently try to relate new material to things they have already learned. This difference between females and males is also evident in eight other countries (figure 26, page 60; table A3.33). Six countries show the opposite pattern, in which greater percentages of males than females report frequently trying to relate new material to things they have already learned, and the remaining countries show no differences between males and females.

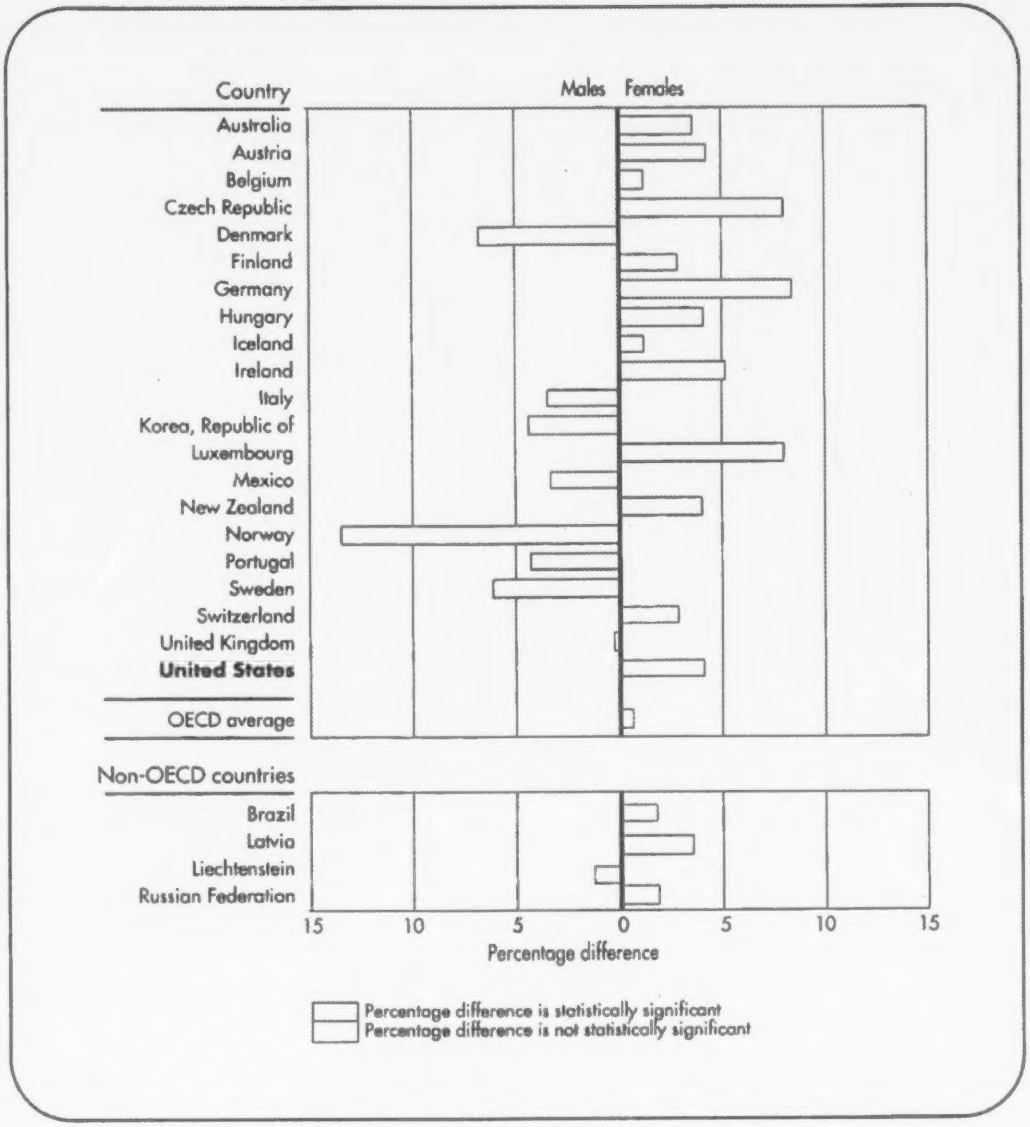
Memorization and elaboration strategies are, of course, not mutually exclusive learning approaches, and about half of U.S. 15-year-olds report using each of these strategies frequently. In both cases, the U.S. percentage is higher than the OECD average percentage. For the U.S., greater percentages of females than males report using each strategy frequently. Again, this preliminary information from PISA 2000 raises more questions than it can answer. Why do greater proportions of females in the United States report using elaboration as a strategy? Why do higher percentages of U.S. students report trying to memorize as much as possible than in other OECD countries? What can this tell us about how 15-year-olds think about learning? How might these learning strategies affect students as they continue on in their lives?

THE FUTURE OF PISA

As noted above, as PISA develops over time, it is planned that general outcomes of learning or cross-curricular competencies will come to play a greater role and that the measures of reading literacy, mathematics literacy, and science literacy will be continually refined and improved.

This report provides an initial look at results from PISA 2000 from a U.S. perspective. As mentioned, the Organization for Economic Cooperation and Development (OECD) has also published a report describing results from PISA 2000. Additionally, over the next 2 years, the OECD will publish a series of additional reports addressing specific themes or questions from PISA 2000 in greater detail. These reports will include an in-depth look at reading literacy, and will also deal in greater depth with issues such as gender and socioeconomic status. Data from PISA 2000 will also be made available to the public and to researchers. As with any international study, PISA's value is largely determined by the countries participating in it. Hopefully, the information contained in this report will be interesting and useful for U.S. policymakers, researchers, and the public.

Figure 26.—Percentage differences by gender of 15-year-olds who report using an elaboration strategy often or always when studying, by country: 2000



NOTE: Elaboration refers to students' relating information they are attempting to learn to things they already know or have learned. Each bar above represents the difference in percentages of males and females in each country who say they use an elaboration strategy often or always. Some of these differences are statistically significant and indicated by darker bars. For instance, in the United States, 4 percent more females than males state they use an elaboration strategy often or always, a difference that is statistically significant. Average percentage difference is calculated by subtracting percentage of males who agree from percentage of females who agree. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 21 OECD countries. The other participating OECD countries did not collect data for this question. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

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Appendix 1

TECHNICAL NOTES

SAMPLING PROCEDURES AND RESPONSE RATES

PISA 2000 developed quality standards, procedures, instruments, and verification mechanisms to ensure that national samples yielded comparable data. Experts from the PISA Consortium monitored the sample selection process in each participating country.[1] PISA's data quality standards required minimum participation rates for educational institutions as well as for students. These standards were established to minimize the potential for response biases.

A minimum response rate target of 85 percent was required for initially selected educational institutions. In instances in which the initial response rate of educational institutions was between 65 and 85 percent, an acceptable school response rate could still be achieved through the use of replacement schools.

PISA 2000 also required a minimum participation rate of 80 percent of students within participating educational institutions (sampled and replacement). A student was considered to be a participant only if he or she participated in the first testing session. The minimum participation rate had to be met at the national level, not necessarily for each participating educational institution.

In the United States, the public and private schools selected for PISA constituted a nationally representative sample of all schools in the country enrolling 15-year-olds. A three-stage sampling design was implemented: the first stage was a sample of primary sampling units (geographic areas referred to as PSUs); the second stage was a sample of schools within PSUs; and the third stage was a sample of students from the set of all students enrolled in the school who were born in the calendar year 1984.

In the first stage of sampling, 52 PSUs were selected. During the second stage, a total sample of 220 schools was selected from within the sampled PSUs. International requirements specified that a minimum of 150 schools be selected. This number was increased to 220 in the United States to offset school nonresponse, design effects from the three-stage design, and design effects from oversampling of high minority schools. The selected schools were located in 33 different U.S. states.

As a supplement to the PISA school sample described above, replacement schools were selected from the unsampled schools on the sampling frame. Each school in the original sample was assigned up to two replacement schools selected from the set of "neighboring" schools on the sampling frame. As the sampling frame is ordered by school characteristics, these neighboring frame schools have similar characteristics to the sampled school, and their addition to the sample can reduce the nonresponse bias incurred from the lack of cooperation of the sampled school.

Ten of the 220 schools in the original sample were ineligible because they did not have any students born in 1984, and a further 82 schools refused to participate, leaving 128 schools before replacement. Thirty-two replacement schools agreed to participate with the result that 160 schools in total agreed to participate in the study. Following data collection, decisions by the international Technical Advisory Group (made up of technical advisors from the PISA Consortium) reduced the number of "participating" schools based on the student response rates within schools. Schools with more than 50 percent student participation were classified as "responding schools." Schools in which 25 to 50 percent of the sampled students participated were classified as "partially responding." Schools with less than 25 percent student participation were treated as "nonresponding," and data from these schools were deleted from the database. In the United States the number of (original/replacement) schools falling into these categories was as follows: responding, (116/29); partially responding, (7/1); and nonresponding, (5/2). For the purposes of calculating school response rates only the 145 responding schools (116 originals plus 29 replacements) were counted. On this basis the school response rate before replacement was 56 percent, and after replacement became 70 percent.

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[1] The PISA Project Consortium consists of the Australian Council for Educational Research (ACER), the Netherlands National Institute for Educational Measurement (CITO), Educational Testing Service (ETS, USA), National Institute for Educational Research (NIER, Japan), and Westat (USA). ACER coordinates the Consortium, under contract to the OECD. In the United States, Westat carried out the PISA assessment.

In total some 4,752 students were sampled from the 145 responding schools. Eligible students were defined as those born in 1984 and in each school a random sample of up to 35 of these eligible students was selected. Some 221 of these students were subsequently classified as ineligible and/or were withdrawn. Exclusion decisions by schools resulted in a further 211 students being excluded from the assessment. The sampling plan provided for sampling from all 15-year-old students within a school. Some of the selected students could have an Individualized Education Plan (IEP) or be identified by the school as limited English proficient (LEP). School staff who were knowledgeable about the school's IEP/LEP students reviewed the list of selected students to determine whether any of them had an IEP or were identified as LEP. School staff identified those students that they felt were unable to meaningfully participate in the assessment. Not all IEP/LEP students were excluded—the following guidelines were used to determine which students would participate:

- ○ **Functionally disabled students.** These are students who are **permanently** physically disabled in such a way that they cannot perform in the testing situation. Functionally disabled students who can respond should be included in the testing. Any sampled student who is **temporarily** disabled such that s/he cannot participate in the assessment will be considered absent from the assessment.
- ○ **Students with mental or emotional disabilities.** These are students who are considered in the professional opinion of the school principal or by other qualified staff members to be educable mentally retarded or who have been psychologically tested as such. This includes students who are emotionally or mentally unable to follow even the general instructions of the test. Students should **not** be excluded solely because of a poor academic performance or normal disciplinary problems.
- ○ **Students with limited proficiency in the test language (English).** These are students who are actually unable to read or speak the language of the test (English) and would be unable to overcome the language barrier in the test situation. Typically, a student who has received less than 1 year of instruction in the language of the test should be excluded; all others should be included.

The students excluded followed the guideline categories as follows: 39 percent were students with mental or emotional disabilities, 33 percent had limited English language proficiency, 24 percent were functionally disabled, and 4 percent were excluded for other reasons, including being home-schooled and participating temporarily in a drug rehabilitation program. In line with the internationally specified procedures, no special attempts were made to accommodate students with physical disabilities over and above those provided by the school itself.

The result of this attrition due to ineligibility, withdrawal, or exclusion was that 4,320 students were eligible to take the assessment. Of these, 620 students failed to take the assessment due to absence and/or parent/student refusals. In total then 3,700 students from the 145 responding schools were assessed. The weighted number of students assessed, expressed as a percentage of the weighted number of eligible students, gave the student response rate of 85 percent, a rate which exceeds the PISA international standard of 80 percent. In addition, 146 students in the partially responding schools took the assessment giving a total of 3,846 students taking the PISA assessment in the United States. All 3,846 students are included in the international database.

While the student response rate exceeds both NCES and PISA standards, the school response rate of 56 percent before replacement fails to meet these standards. In the case of PISA a rate of 65 percent was required. The United Kingdom and the Netherlands also fell below the PISA standard for response rates. Each nation undertook analyses designed to examine the extent of bias, if any, introduced by this level of nonresponse. Since assessment data are not available for the nonresponding schools, the analysis of the PISA data for the United States compared participants and nonparticipants in the original and original plus replacement samples using logistic regression to predict participation. The predictors in question were sampling frame school variables with a history of association with student achievement in various national assessments—region, metropolitan/nonmetropolitan, public/private, type of school, percentage minority, percent eligible for free lunch, estimated number of 15-year-olds, and school grade-span. These analyses indicate that there are differences between responding and nonresponding schools in some of these respects. Region, metropolitan/nonmetropolitan status, percentage minority, and percentage eligible for free lunch were found to be significant predictors of school nonresponse. In addition, there was a nonlinear relationship with minority (Black and Hispanic) enrollment—schools with relatively high, and relatively low, minority enrollment were considerably more likely to participate than those with intermediate levels of minority enrollment. While the implications of these analyses for the direction of any resulting bias in achievement are not entirely clear, an attempt was made to minimize any bias by incorporating the four variables in question into the adjustment for school nonresponse that is a component of the sampling weights. In the judgment of the international Technical Advisory Group this was sufficient to ensure that any remaining bias was likely to be minimal and hence that the data for the United States were included in the international database. A similar judgment was applied to the analyses conducted by the United Kingdom, but not for the Netherlands.

Schools were contacted again approximately 1 week before the assessment to select the student sample and arrange for assessment space in the school. Assessments were conducted in the United States in the spring of 2000 by trained test administration field staff that visited each of the participating schools and administered both the assessments and the questionnaires.

Table A1.1 provides summary information on the samples of all countries. A more detailed presentation can be found in the OECD's forthcoming PISA 2000 technical report.

GRADE DISTRIBUTIONS

The students in PISA are selected on the basis that they are 15 years old and, as a result, are spread across several grades. Grade distributions for 15-year-olds vary from country to country as a function of policies about age of entry to school or other educational policies. The proportions of students at each grade level in each of the participating nations are shown in table A1.2.

QUALITY ASSURANCE

PISA 2000 emphasized the use of standardized procedures in all countries. The PISA Consortium provided comprehensive manuals to explain the survey's implementation, including precise instructions for the work of school co-coordinators and scripts for test administrators

Table A1.1.—Coverage of target population, student and school samples, and participation rates, by country: 2000

Country	Total population of 15-year-olds	Coverage of 15-year-old population	Coverage of national desired population	Overall student exclusion rate	Weighted school participation rate before replacement	Weighted school participation rate after replacement	Weighted student participation rate after replacement	Number of participating schools after replacement (unweighted)	Number of participating students after replacement (unweighted)
	Number	Percent	Percent	Percent	Percent	Percent	Percent	Number	Number
Australia	266,878	86	98	2.3	81	94	84	228	5,154
Austria	95,041	75	99	0.7	99	100	92	213	4,745
Belgium[1]	121,121	91	98	2.3	69	86	93	214	6,648
Belgium (Flemish)	71,074	86	98	2.0	62	80	95	119	3,874
Belgium (French)	49,289	99	97	2.7	80	94	91	95	2,774
Canada	403,803	86	95	4.9	88	93	85	1098	29,461
Czech Republic	134,627	93	98	1.9	95	99	93	227	5,343
Denmark	53,693	89	97	3.1	84	95	92	223	4,212
Finland	66,571	94	98	1.9	97	100	93	155	4,864
France	788,387	93	97	3.5	95	95	91	174	4,657
Germany	927,473	89	98	1.7	95	95	86	213	4,983
Greece	128,175	87	99	0.8	84	100	97	139	4,672
Hungary	120,759	89	99	0.7	99	99	95	193	4,883
Iceland	4,062	95	98	2.4	100	100	87	130	3,372
Ireland	65,339	86	95	4.8	86	88	86	135	3,786
Italy	584,417	87	98	2.5	98	100	93	170	4,984
Japan	1,490,000	97	98	2.3	82	90	96	135	5,256
Korea	712,812	81	100	0.4	100	100	99	146	4,982
Luxembourg	4,556	91	91	9.1	93	93	89	23	3,434
Mexico	2,127,504	45	100	0.1	93	100	94	182	4,600
Netherlands	178,924	88	96	4.4	27	55	84	100	2,503
New Zealand	54,220	86	95	5.1	78	86	88	152	3,667
Norway	52,165	95	97	2.7	86	92	89	176	4,147
Poland[2]	665,500	81	90	9.7	79	83	88	126	3,639
Portugal	132,325	76	97	2.7	95	95	86	145	4,517
Spain	462,082	86	97	2.7	95	100	92	185	6,214
Sweden	100,940	93	95	4.7	100	100	88	159	4,416
Switzerland	81,350	89	98	2.3	92	96	95	282	6,084
United Kingdom[3]	731,743	88	95	4.9	61	82	81	349	9,250
England	603,100	93	95	5.4	59	82	81	148	4,099
Northern Ireland	26,043	99	96	4.2	71	79	86	113	2,825
Scotland	65,200	87	98	1.8	80	82	78	88	2,326
United States	3,876,000	81	96	4.1	56	70	85	145	3,700
Non-OECD countries									
Brazil[4]	3,464,330	69	99	0.7	97	98	87	318	4,885
Latvia	38,000	79	96	3.8	82	89	91	153	3,915
Liechtenstein	415	78	99	0.6	100	100	97	11	314
Russian Federation	2,268,566	87	99	0.7	99	99	96	238	6,701

[1] The sampling numbers for Belgium exceed the sum of the two parts because German Belgium is also included in these numbers.
[2] Primary schools in Poland were not randomly sampled and therefore these students could not be used.
[3] The sampling numbers for the United Kingdom exceed the sum of the three parts because Wales is also included in these numbers.
[4] Brazilian students in grades 5 and 6 were excluded.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A1.2.—Percentage distributions of 15-year-olds by grade and assessment subject, by country: 2000

	READING				MATHEMATICS				SCIENCE			
	Grade 8 and below	Grade 9	Grade 10	Grade 11 and above	Grade 8 and below	Grade 9	Grade 10	Grade 11 and above	Grade 8 and below	Grade 9	Grade 10	Grade 11 and above
Country	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Australia	#	7	76	17	#	7	75	18	#	6	76	17
Austria	5	45	48	#	5	46	47	#	5	45	48	#
Belgium	6	28	65	1	6	27	65	1	5	28	65	1
Canada	2	13	81	1	2	13	81	2	2	13	82	1
Czech Republic	3	43	54	0	3	43	54	0	3	43	54	0
Denmark	6	89	3	0	6	89	3	0	6	90	2	0
Finland	11	89	0	0	11	89	0	0	11	89	0	0
France	7	37	53	3	8	37	53	3	7	37	54	2
Germany	16	60	23	#	16	60	23	#	16	60	23	#
Greece	2	6	75	16	3	5	75	16	3	5	76	15
Hungary	8	57	35	0	8	56	35	0	8	57	35	0
Iceland	0	0	100	0	0	0	100	0	0	0	100	0
Ireland	3	62	16	19	3	61	17	19	3	62	16	18
Italy	1	16	76	6	1	16	77	6	1	16	77	6
Japan	0	0	100	0	0	0	100	0	0	0	100	0
Korea, Republic of	0	1	99	1	0	1	98	1	0	1	98	1
Luxembourg	19	56	25	0	19	56	24	0	18	56	26	0
Mexico	14	29	50	#	13	29	50	#	13	30	50	#
New Zealand	0	0	7	93	0	0	7	93	0	0	7	92
Norway	#	1	98	1	#	1	98	1	#	1	98	1
Poland	0	100	0	0	0	100	0	0	0	100	0	0
Portugal	19	28	51	#	19	28	51	#	20	27	51	#
Spain	2	25	72	#	2	26	72	#	3	26	71	0
Sweden	2	97	#	0	2	97	1	0	2	97	1	0
Switzerland	20	64	14	#	20	64	14	#	20	65	14	#
United Kingdom	0	#	34	66	0	#	34	66	0	#	34	65
United States	4	40	56	#	4	41	55	#	3	39	57	#
OECD average	6	37	49	8	6	37	48	8	6	37	49	8
Non-OECD countries												
Brazil	42	49	9	0	42	49	9	0	42	49	9	0
Latvia	11	39	50	#	11	39	50	#	10	39	51	#
Liechtenstein	17	78	3	0	16	78	3	0	18	78	3	0
Russian Federation	2	27	70	1	2	27	70	1	2	28	70	1

#Too small to report.

NOTE: Percentages do not necessarily sum to 100 due to rounding and/or because of small percentages of unclassifiable grade levels in some nations. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The grade distributions reported for Latvia are for the reading literacy section of the assessment. The actual numbers for mathematics and science literacy may vary slightly due to different numbers of 15-year-olds taking each assessment. The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

for use in testing sessions. The quality and linguistic equivalence of instruments was ensured by providing countries with source versions of the assessment instruments in two languages (English and French) and recommending countries prepare and consolidate independent translations from both source versions, providing precise translation guidelines that included a description on the features each item was measuring and statistical analysis from the field trial. In cases where one source language was used, independent translations were required and discrepancies reconciled. The PISA Consortium verified the national translation and adaptation of all instrumentation. Additionally, members of the PISA Consortium visited all national centers to review data collection procedures, and members of the PISA Consortium visited a randomly selected subsample of 25 percent of the educational institutions. For a detailed description of the quality assurance procedures, see the OECD's forthcoming technical report on PISA 2000.

TEST DEVELOPMENT

The development of the PISA 2000 assessment instruments was an interactive process among the PISA Consortium, various expert committees, and OECD governments. The intention was to reflect the national, cultural, and linguistic variety among OECD countries. The assessments included material selected from among items submitted by participating countries as well as items that were developed by the Consortium's test developers. Each item, or question, was rated by each country on potential cultural, gender, or other types of bias. A small prepilot was conducted in a limited number of countries prior to a field trial, which was conducted in all countries in 1999. Approximately 120 units (passages or pictures with related questions) were developed for the field trial, including more than 800 reading items. The field trial included 69 units with 342 items and the main study included 37 units with 141 items. The mathematics instrument included 32 items; the science instrument included 35 items.

The assessment instruments included curricular and noncurricular components following the framework specifications defined by subject matter experts (OECD 1999). One of the characteristics of the PISA 2000 instruments was the large amount of items requiring students to construct their own response. In reading, 45 percent of items required an open-constructed response while this item type accounted for 35 percent of the mathematics and science tests. Five item types were used in the PISA instruments: multiple choice, complex multiple choice, closed-constructed response, short response, and open-constructed response.

The assessments were designed to yield group-level information in a broad range of content while meeting the limitation of 120 minutes of testing time per student. To achieve this goal, an unbalanced rotation design permitted an overall assessment of 270 minutes of reading, 60 minutes of mathematics, and 60 minutes of science. The assessment in each domain was divided into clusters, organized into nine booklets. There were nine 30-minute reading clusters, four 15-minute clusters of mathematics, and four 15-minute clusters of science. In PISA 2000, every student answered reading items; over half the students answered items on science and mathematics.

This assessment design provides several features. First, the reading material was presented in a balanced way in order to avoid position effects and to ensure that each item had equal weight in the assessment. Second, seven of the nine booklets began with reading, and all booklets contained at least 60 minutes of reading. Five booklets also contained items for science, and five contained items for mathematics. Third, PISA 2000 included a link between PISA and IALS (the International Adult Literacy Study) through two reading blocks containing only IALS items, which were presented in six of the nine booklets. Finally, this design ensures that a representative sample of students responded to each block of items. The OECD will publish further information on the PISA 2000 assessment design in a forthcoming technical report.

SCORING

PISA's assessment of reading included 270 minutes of testing time, of which 45 percent was devoted to items requiring open-ended responses. The mathematics and science tests included 60 minutes of testing time, of which 35 percent was assessed through open-ended items. The process of scoring these items was an important step in ensuring the quality and comparability of the PISA data.

Detailed guidelines were developed for the scoring guides themselves, training materials to recruit scorers, and workshop materials used for the training of national scorers. Prior to the national training, the PISA Consortium organized training sessions to present the material and train the scoring coordinators from the participating countries, who trained the national scorers.

For each test item, the scoring guide described the intent of the question and how to code the students' responses to each item. This description included the credit labels—full credit, partial credit, or no credit—attached to the possible categories of response. Also included was a system of double-digit coding for the mathematics and science items where the first digit represented the score, and the second digit represented different strategies or approaches that students used to solve the problem. The second digit generated national profiles of student strategies and misconceptions. In addition, the scoring guides included real examples of students' responses accompanied by a rationale for their classification for purposes of clarity and illustration.

To examine the consistency of this marking process in more detail within each country and to estimate the magnitude of the variance components associated with the use of markers, the PISA Consortium conducted an interscorer reliability study on a subsample of assessment booklets. Homogeneity analysis was applied to the national sets of multiple scoring and compared with the results of the field trial. A full description of this process and the results can be found in a technical report on PISA 2000 to be published by the OECD.

WEIGHTING

Students included in the final PISA sample for a given country are not all equally representative of the full student population, even though random sampling of schools and students is used to select the sample. The use of sampling weights is necessary for the computation of statistically sound, nationally representative estimators. Survey weights help adjust for intentional over- or under-sampling of certain sectors of the population, school or student nonresponse, or errors in estimating size of a school at the time of sampling.

For example, the United States over-sampled for minorities in public schools with 15 percent or more minority students in order to obtain enough data on these students to report accurately on them. Sampling weights were applied to the data to adjust for this over-sampling in order to ensure that the U.S. student sample represents the overall 15-year-old student population. The weight assigned to a student's responses is the inverse of the probability that the student would be selected for the sample. When responses are weighted, none are discarded, and each contributes to the results for the total number of students represented by the individual student assessed. Weighting also adjusts for various situations, such as school and student nonresponse, because data cannot be assumed to be randomly missing. The internationally defined weighting specifications for PISA require that each assessed student's sampling weight be the product of the inverse of the school's probability of selection, an adjustment for school-level nonresponse, the inverse of the student's probability of selection, and an adjustment for student-level nonresponse. In addition, in the United States, two grade nonresponse factors were needed, one for grade 9 and one for grade 10. All PISA analyses are conducted using these sampling weights.

The procedures being used to derive the survey weights for PISA are in accordance with standards of best practice for the analysis of complex survey data. They correspond to procedures that are used to analyze survey data by the world's major statistical agencies, as well as conforming to Westat's own current best methods. These are also the procedures that have been used in previous international studies of educational achievement including TIMSS and TIMSS-R.

SCALING AND PLAUSIBLE VALUES

PISA used Item Response Theory (IRT) methods to produce scale scores that summarized the achievement results. PISA 2000 utilized a mixed coefficients multinomial logit IRT model to produce score scales that summarized the achievement results. This model is similar in principle to the more familiar two parameter IRT model. With this method, the performance of a sample of students in a subject area or subarea can be summarized on a single scale or a series of scales, even when different students are administered different items. Because of the reporting requirements for PISA and because of the large number of background variables associated with the assessment, a large number of analyses had to be conducted. The procedures PISA used for the analyses were developed to produce accurate results for groups of students while limiting the testing burden on individual students. Furthermore, these procedures provided data that could be readily used in secondary analyses. IRT scaling provides estimates of item parameters (e.g., difficulty, discrimination) that define the relationship between the item and the underlying variable measured by the test. Parameters of the IRT model are estimated for each test question, with an overall scale being established as well as scales for each predefined content area specified in the assessment framework. For example, PISA 2000 had four scales describing reading (a combined score and subscale scores in three domains) and one each for mathematics and science.

Plausible Values

During the scaling phase, plausible values were used to characterize scale scores for students participating in the assessment. To keep student burden to a minimum, PISA administered few assessment items to each student—too few to produce accurate content-related scale scores for each student. To account for this, PISA generated five possible scale scores for each student that represented selections from the distribution of scale scores of students with similar backgrounds who answered the assessment items the same way. The plausible-values technology is one way to ensure that the estimates of the average performance of student populations and the estimates of variability in those estimates are more accurate than those determined through traditional procedures, which estimate a single score for each student. During the construction of plausible values, careful quality control steps ensured that the subpopulation estimates based on these plausible values were accurate.

It is important to recognize that plausible values are *not* test scores and should not be treated as such. Plausible values are random numbers that are drawn from the distribution of scores that could be reasonably assigned to each individual. As such, the plausible values contain random error variance components and are not optimal as scores for individuals. The PISA student file contains 30 plausible values, five for each of the five PISA 2000 cognitive scales (three reading subscales, one mathematics, and one science scale) and five for the combined reading scale. If an analysis is to be undertaken with one of these five cognitive scales, then (ideally) the analysis should be undertaken five times, once with each of the five relevant plausible values variables. The results of these five analyses are averaged and then significance tests that adjust for variation between the five sets of results are computed.

PISA uses the plausible-values methodology to represent what the true performance of an individual might have been, had it been observed, using a small number of random draws from an empirically derived distribution of score values based on the student's observed responses to assessment items and on background variables. Each random draw from the distribution is considered a representative value from the distribution of potential scale scores for all students in the sample who have similar characteristics and identical patterns of item responses. The draws from the distribution are different from one another to quantify the degree of precision (the width of the spread) in the underlying distribution of possible scale scores that could have caused the observed performances. The PISA plausible values function like point estimates of scale scores for many purposes, but they are unlike true point estimates in several respects. They differ from one another for any particular student, and the amount of difference quantifies the spread in the underlying distribution of possible scale scores for that student. Because of the plausible-values approach, secondary researchers can use the PISA data to carry out a wide range of analyses.

STATISTICAL PROCEDURES

Tests of significance

Comparisons made in the text of this report have been tested for statistical significance. For example, in the commonly made comparison of country averages against the average of the United States, tests of statistical significance were used to establish whether or not the observed differences from the U.S. average were statistically significant.

In almost all instances the tests used were standard *t*-tests. These fell into two categories according to the nature of the comparison being made. In simple comparisons of country averages against the U.S. average or against the OECD average, the following formula was used to compute the *t* statistic:

$$t = \text{Est}_1 - \text{Est}_2 / \text{SQRT}[(\text{se}_1)^2 + (\text{se}_2)]^2$$

Est_1 and Est_2 are the estimates being compared (e.g., average of country A and the U.S. average) and se_1 and se_2 are the corresponding standard errors of these averages.

In several places, between-country comparisons of group differences within countries were made. Comparisons of gender differences in other PISA countries against gender differences in the United States are an example. In these instances the following formula was used:

$$t = (\text{Est}_{11} - \text{Est}_{21}) - (\text{Est}_{12} - \text{Est}_{22}) / \text{SQRT}[(\text{se}_{11}{}^2 + \text{se}_{21}{}^2) + (\text{se}_{12}{}^2 + \text{se}_{22}{}^2)]$$

Est_{11} and Est_{21} are the estimates being compared within country A (e.g., female reading average and male reading average), Est_{12} and Est_{22} are the corresponding estimates for the United States, and se_{11}, se_{21}, se_{12}, and se_{22} are their corresponding standard errors.

Since the International Socio-Economic Index (ISEI) is a continuous measure with no obvious cut-points that would allow the identification of socioeconomic groups, the linkage of socioeconomic status to average literacy scores is shown as a relationship rather than a difference between group averages. The measure of relationship in this case is a regression coefficient. For reading, mathematics, and science literacy measures, simple bivariate regressions were estimated within each country. The five plausible values available for each literacy measure were treated as the dependent variable and the ISEI index as the independent variable. These analyses were undertaken within Wesvar in order to obtain the correct standard errors for these statistics. Regression coefficients for other PISA countries could then be tested against the U.S. coefficient.

To guard against errors of inference based on multiple comparisons, as in the case of comparing all countries to the United States, the Bonferroni adjustment procedure was used. This procedure increases the critical value of *t* as the number of comparisons increases. For example, when making a simple pairwise comparison, the *t* value must be 1.96 or greater to achieve statistical significance at the .05 level of confidence. When making comparisons of all countries against the United States, the number of comparisons is 30 and the critical value required for statistical significance is 3.14 at the .05 level.

Standard errors

The estimation of the standard errors that are required in order to undertake the tests of significance is complicated by the complex sample and assessment designs which both generate error variance. Together they mandate a set of statistically complicated procedures in order to estimate the correct standard errors. As a consequence, the estimated standard errors contain a sampling variance component estimated by Balanced Repeated Replication (BRR)—the Fay method of BRR; and, where the assessments are concerned, an additional imputation variance component arising from the assessment design. Details on the procedures used can be found in the *WesVar 4.0 User's Guide* (Westat 2000).

LITERACY LEVELS

While the basic form of measurement in PISA describes student literacy in each country in terms of a range of scale scores, PISA also treats proficiency in reading literacy in terms of five levels, each representing tasks of increasing complexity. As a result, the literacy findings are reported in terms of percentages of the population proficient at handling tasks of different levels of difficulty.

Each of the four reading literacy scales—the combined score and the three subscale scores—is divided into five levels based on the type of knowledge and skills students need to demonstrate at a particular level. Cut scores for the levels are as follows: below level 1: a score equal to or less than 334.75; level 1: a score greater than 334.75 and equal to or below 407.47; level 2: a score greater than 407.47 and equal to or below 480.18; level 3: a score greater than 480.18 and equal to or below 552.89; level 4: a score greater than 552.89 and equal to or below 625.61; and level 5: a score greater than 625.61.

All students within a level are expected to answer at least half of the items from that level correctly. Students at the bottom of a level have a 62 percent chance of success on the easiest items from that level and a 42 percent chance of success on the hardest items from that level. Students at the top of a level are able to provide the correct answers to about 70 percent of all items from that level, have a 62 percent chance of success on the hardest items from that level, and have a 78 percent chance of success on the easiest items from that level. Students just below the top of a level would score less than 50 percent on an assessment of the next higher level. Students at a particular level not only demonstrate the knowledge and skills associated with that level but also the proficiencies defined by lower levels. Thus, all students proficient at level 3 are also proficient at levels 1 and 2. All students within a level are expected to answer at least half of the items in that level correctly. Patterns of responses for students below level 1 suggest they are unable to answer at least half of the items in level 1 correctly.

Appendix 2

DESCRIPTIONS OF INTERNATIONAL STUDIES OF READING, MATHEMATICS, AND SCIENCE

Table A2.1.—Descriptions of international assessments of reading

	PISA	PIRLS	ALL
Age	15-year-olds	9-year-olds	16 through 65-year-olds
Periodicity	Every 3 years 2000, 2003, 2006, 2009...	Every 4 years 2001, 2005, 2009...	Follow-up to International Adult Literacy Study (IALS) 1994, 2002...
Domains	Reading literacy, mathematics literacy, and science literacy	Reading literacy	Document literacy, prose literacy, numeracy, and analytic reasoning
Definition	Understanding, using, and reflecting on written texts in order to achieve one's goals, to develop knowledge and potential, and to participate in society.	Understanding and using those written language forms required by society and/or valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in a community of readers, and for enjoyment.	Using printed and written information to function in society to achieve one's goals and to develop one's knowledge and potential.
Framework components	Types of text: (1) continuous, e.g., narrative and (2) non-continuous, e.g., map Situations: (1) Reading for public use; (2) reading for private use; (3) reading for work; and (4) reading for education Processes: (1) retrieving information; (2) broad understanding; (3) developing an interpretation; (4) reflecting on content; and (5) reflecting on form	Processes: (1) focus on and retrieve explicitly stated information; (2) make straightforward inferences; (3) interpret and integrate ideas and information; and (4) examine and evaluate context, language, and text elements Purposes of reading: (1) reading for literary experience and (2) reading to acquire and use information	Prose literacy: (1) locating information; (2) integrating information; and (3) generating information Document literacy: (1) locating information; (2) cycling information; (3) integrating information; and (4) generating information Contexts and contents: (1) home and family; (2) health and safety; (3) community and citizenship; (4) consumer electronics; (5) work; and (6) leisure and recreation
Reporting scales	Overall and processes of reading	Overall and purposes of reading	Prose and document literacy

NOTE: PISA is the Program for International Student Assessment. PIRLS is the Progress in International Reading Literacy Study. ALL is the Adult Literacy and Lifeskills survey.

SOURCE: Adult Literacy and Lifeskills survey (2001b). *Prose and Document Literacy Framework*. Available: ftp://etsis1.ets.org/pub/corp/Prose-final.pdf; Campbell, J.R., Kelly, D.L., Mullis, I.V.S., Martin, M.O., and Sainsbury, M. (2001). *Framework and Specifications for PIRLS Assessment 2001*. Chestnut Hill, MA: Boston College; Organization for Economic Cooperation and Development (1999). *Measuring Student Knowledge and Skills: A New Framework for Assessment.* Paris: Author.

Table A2.2.—Descriptions of international assessments of mathematics

	PISA	TIMSS-R	ALL
Age	15-year-olds	13-year-olds	16 through 65-year-olds
Periodicity	Every 3 years 2000, 2003, 2006, 2009…	Every 4 years 1995, 1999, 2003…	Follow-up to International Adult Literacy Study (IALS) 1994, 2002…
Domains	Reading literacy, mathematics literacy, and science literacy	Mathematics and science	Document literacy, prose literacy, numeracy, and analytic reasoning
Definition	An individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments and to engage in mathematics, in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen.	Curricular mathematics as defined by content areas (see framework components) agreed upon by participating countries.	The knowledge and skills required to effectively manage the mathematical demands of diverse situations.
Framework components	Major topics: (1) quantity; (2) space and shape; (3) change and relationships; and (4) uncertainty Competency classes/processes: (1) reproduction and routine procedures; (2) connections and integration for standard problem solving; and (3) reasoning, argumentation, insight and generalization for original problem solving Situations: (1) personal; (2) educational; (3) occupational; (4) public; and (5) scientific	Content areas: (1) fractions and number sense; (2) data representation, analysis, and probability; (3) algebra; (4) measurement; and (5) geometry Performance expectations: (1) knowing; (2) using routine procedures; (3) investigation and solving problems; (4) mathematical reasoning; and (5) communicating	Facets: numerate behavior involves managing a situation or solving a problem in a real context by responding to mathematical information that is represented in a range of ways and requires activation of a range of enabling knowledge, behaviors, and processes.
Reporting scales	Overall and by sub-scales to be determined (2003)	Overall and by content area	Numeracy

NOTE: PISA is the Program for International Student Assessment. TIMSS-R is the Third International Mathematics and Science Study-Repeat. ALL is the Adult Literacy and Lifeskills survey.

SOURCE: Adult Literacy and Lifeskills survey (2001a). *Numeracy Framework*. Available: ftp://etsis1.ets.org/pub/corp/Numeracy%20Framework.pdf; Organization for Economic Cooperation and Development (1999). *Measuring Student Knowledge and Skills: A New Framework for Assessment*. Paris: Author; Robitaille, D.F., Schmidt, W.H., Raizen, S., McKnight, C., Britton, E., and Nicol, C. (1993). *Curriculum Frameworks for Mathematics and Science*. TIMSS monograph no. 1. Vancouver, BC: Pacific Education Press.

Table A2.3.—Descriptions of international assessments of science

	PISA	TIMSS-R
Age	15-year-olds	13-year-olds
Periodicity	Every 3 years 2000, 2003, 2006, 2009…	Every 4 years 1995, 1999, 2003…
Domains	Reading literacy, mathematics literacy, and science literacy	Mathematics and science
Definition	The capacity to use scientific knowledge, to identify questions, and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity.	Curricular science as defined by content areas (see framework components) agreed upon by participating countries.
Framework components	Scientific applications: (1) science in life and health; (2) science in Earth and environment; and (3) science in technology	Content areas: (1) earth science; (2) life science; (3) physics; (4) chemistry; (5) environment and resource issues; and (6) scientific inquiry and the nature of science
	Scientific processes: (1) recognizing scientifically investigable questions; (2) identifying evidence needed in a scientific investigation; (3) drawing or evaluating conclusions; (4) communicating valid conclusions; and (5) demonstrating comprehension of scientific concepts	Performance expectations: (1) understanding simple information; (2) understanding complex information; (3) theorizing, analyzing, and solving problems; (4) using tools, routine procedures, and science processes; and (5) investigating the natural world
	Situations: (1) personal; (2) public; (3) global; and (4) historical relevance	
Reporting scales	Overall and by sub-scales to be determined (2006)	Overall and by content area

NOTE: PISA is the Program for International Student Assessment. TIMSS-R is the Third International Mathematics and Science Study-Repeat. The framework for the Program for International Student Assessment (PISA) does include a list of 13 concepts to be assessed by PISA. However, in PISA 2000 these concepts are assessed through the scientific applications listed above.

SOURCE: Organization for Economic Cooperation and Development (1999). *Measuring Student Knowledge and Skills: A New Framework for Assessment*. Paris: Author; Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., Gregory, K.D., Smith, T.A., Chrostowski, S.J., Garden, R.A., and O'Connor, K.M. (2000). *TIMSS 1999 International Science Report: Findings from IEA's Repeat of the Third International Mathematics and Science Study at the Eighth Grade*. Chestnut Hill, MA: Boston College.

3

SUPPORTING STATISTICAL DATA

Table A3.1.—Combined reading literacy averages and subscale scores of 15-year-olds with standard errors, by country: 2000

Country	Combined reading literacy		Retrieving information		Interpreting texts		Reflecting on texts	
	Average	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Australia	528	3.5	536	3.7	527	3.5	526	3.4
Austria	507	2.4	502	2.3	508	2.4	512	2.7
Belgium	507	3.6	515	3.9	512	3.2	497	4.3
Canada	534	1.6	530	1.7	532	1.6	542	1.6
Czech Republic	492	2.4	481	2.7	500	2.4	485	2.6
Denmark	497	2.4	498	2.8	494	2.4	500	2.6
Finland	546	2.6	556	2.8	555	2.9	533	2.7
France	505	2.7	515	3.0	506	2.7	496	2.9
Germany	484	2.5	483	2.4	488	2.5	478	2.9
Greece	474	5.0	450	5.4	475	4.5	495	5.6
Hungary	480	4.0	478	4.4	480	3.8	481	4.3
Iceland	507	1.5	500	1.6	514	1.4	501	1.3
Ireland	527	3.2	524	3.3	526	3.3	533	3.1
Italy	487	2.9	488	3.1	489	2.6	483	3.1
Japan	522	5.2	526	5.5	518	5.0	530	5.4
Korea, Republic of	525	2.4	530	2.5	525	2.3	526	2.6
Luxembourg	441	1.6	433	1.6	446	1.6	442	1.9
Mexico	422	3.3	402	3.9	419	2.9	446	3.7
New Zealand	529	2.8	535	2.8	526	2.7	529	2.9
Norway	505	2.8	505	2.9	505	2.8	506	3.0
Poland	479	4.5	475	5.0	482	4.3	477	4.7
Portugal	470	4.5	455	4.9	473	4.3	480	4.5
Spain	493	2.7	483	3.0	491	2.6	506	2.8
Sweden	516	2.2	516	2.4	522	2.1	510	2.3
Switzerland	494	4.2	498	4.4	496	4.2	488	4.8
United Kingdom	523	2.6	523	2.5	514	2.5	539	2.5
United States	504	7.0	499	7.4	505	7.1	507	7.1
OECD average	500	0.6	498	0.7	501	0.6	502	0.7
Non-OECD countries								
Brazil	396	3.1	365	3.4	400	3.0	417	3.3
Latvia	458	5.3	451	5.7	459	4.9	458	5.9
Liechtenstein	483	4.1	492	4.9	484	4.5	468	5.7
Russian Federation	462	4.2	451	4.9	468	4.0	455	4.0

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.2.—Correlations of combined reading literacy and subscales, mathematics literacy and science literacy, by subject: 2000

	Total scores			**Reading Subscales**		
Subject	**Reading literacy**	**Mathematics literacy**	**Science literacy**	**Retrieving information**	**Interpreting texts**	**Reflecting on texts**
Reading literacy	1.00	†	†	†	†	†
Mathematics literacy	0.92	1.00	†	†	†	†
Science literacy	0.95	0.93	1.00	†	†	†
Retrieving information	0.99	0.94	0.94	1.00	†	†
Interpreting texts	0.99	0.91	0.94	0.98	1.00	†
Reflecting on texts	0.96	0.82	0.91	0.91	0.93	1.00

†Not applicable.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.3.—Average combined reading literacy scores of 15-year-olds by percentiles with standard errors, by country: 2000

Country	Average	s.e.	Standard deviation	s.e.	5th percentile		10th percentile		25th percentile		75th percentile		90th percentile		95th percentile	
					Score	s.e.	Score	s.e.	Score	s.e.	Score	s.e.	Score	s.e.	Score	s.e.
Australia	528	3.5	102	1.6	354	4.8	394	4.4	458	4.4	602	4.6	656	4.2	685	4.5
Austria	507	2.4	93	1.6	341	5.4	383	4.2	447	2.8	573	3.0	621	3.2	648	3.7
Belgium	507	3.6	107	2.4	308	10.3	354	8.9	437	6.6	587	2.3	634	2.5	659	2.4
Canada	534	1.6	95	1.1	371	3.8	410	2.4	472	2.0	600	1.5	652	1.9	681	2.7
Czech Republic	492	2.4	96	1.9	320	7.9	368	4.9	433	2.8	557	2.9	610	3.2	638	3.6
Denmark	497	2.4	98	1.8	326	6.2	367	5.0	434	3.3	566	2.7	617	2.9	645	3.6
Finland	546	2.6	89	2.6	390	5.8	429	5.1	492	2.9	608	2.6	654	2.8	681	3.4
France	505	2.7	92	1.7	344	6.2	381	5.2	444	4.5	570	2.4	619	2.9	645	3.7
Germany	484	2.5	111	1.9	284	9.4	335	6.3	417	4.6	563	3.1	619	2.8	650	3.2
Greece	474	5.0	97	2.7	305	8.2	342	8.4	409	7.4	543	4.5	595	5.1	625	6.0
Hungary	480	4.0	94	2.1	320	5.6	354	5.5	414	5.3	549	4.5	598	4.4	626	5.5
Iceland	507	1.5	92	1.4	345	5.0	383	3.6	447	3.1	573	2.2	621	3.5	647	3.7
Ireland	527	3.2	94	1.7	360	6.3	401	6.4	468	4.3	593	3.6	641	4.0	669	3.4
Italy	487	2.9	91	2.7	331	8.5	368	5.8	429	4.1	552	3.2	601	2.7	627	3.1
Japan	522	5.2	86	3.0	366	11.4	407	9.8	471	7.0	582	4.4	625	4.6	650	4.3
Korea, Republic of	525	2.4	70	1.6	402	5.2	433	4.4	481	2.9	574	2.6	608	2.9	629	3.2
Luxembourg	441	1.6	100	1.5	267	5.1	311	4.4	378	2.8	513	2.0	564	2.8	592	3.5
Mexico	422	3.3	86	2.1	284	4.4	311	3.4	360	3.6	482	4.8	535	5.5	565	6.3
New Zealand	529	2.8	108	2.0	337	7.4	382	5.2	459	4.1	606	3.0	661	4.4	693	6.1
Norway	505	2.8	104	1.7	320	5.9	364	5.5	440	4.5	579	2.7	631	3.1	660	4.6
Poland	479	4.5	100	3.1	304	8.7	343	6.8	414	5.8	551	6.0	603	6.6	631	6.0
Portugal	470	4.5	97	1.8	300	6.2	337	6.2	403	6.4	541	4.5	592	4.2	620	3.9
Spain	493	2.7	85	1.2	344	5.8	379	5.0	436	4.6	553	2.6	597	2.6	620	2.9
Sweden	516	2.2	92	1.2	354	4.5	392	4.0	456	3.1	581	3.1	630	2.9	658	3.1
Switzerland	494	4.2	102	2.0	316	5.5	355	5.8	426	5.5	567	4.7	621	5.5	651	5.3
United Kingdom	523	2.6	100	1.5	352	4.9	391	4.1	458	2.8	595	3.5	651	4.3	682	4.9
United States	504	7.0	105	2.7	320	11.7	363	11.4	436	8.8	577	6.8	636	6.5	669	6.8
OECD average	500	0.6	100	0.4	324	1.3	366	1.1	435	1.0	571	0.7	623	0.8	652	0.8
Non-OECD countries																
Brazil	396	3.1	86	1.9	255	5.0	288	4.5	339	3.4	452	3.4	507	4.2	539	5.5
Latvia	458	5.3	102	2.3	283	9.7	322	8.2	390	6.9	530	5.3	586	5.8	617	6.6
Liechtenstein	483	4.1	96	3.9	310	15.9	350	11.8	419	9.4	551	5.8	601	7.1	626	8.2
Russian Federation	462	4.2	92	1.8	306	6.9	340	5.4	400	5.1	526	4.5	579	4.4	608	5.3

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.4.—Percentage of 15-year-olds reaching the PISA top 10 percent, top 25 percent, top 50 percent, and top 75 percent on the combined reading literacy scale, by country: 2000

	Top 10 percent		Top 25 percent		Top 50 percent		Top 75 percent	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Australia	18	1.2	36	1.6	59	1.5	81	1.1
Austria	9	0.8	26	1.2	53	1.3	78	1.0
Belgium	13	0.6	31	1.0	56	1.4	75	1.4
Canada	18	0.6	37	0.6	63	0.7	85	0.5
Czech Republic	7	0.6	20	0.9	46	1.2	74	0.9
Denmark	9	0.5	23	1.0	49	1.0	75	1.0
Finland	19	0.9	42	1.2	70	1.0	89	0.8
France	9	0.5	25	0.9	51	1.3	78	1.3
Germany	9	0.6	23	0.8	45	1.1	70	1.0
Greece	5	0.7	16	1.4	39	2.0	66	2.3
Hungary	5	0.8	17	1.3	41	1.9	68	1.8
Iceland	10	0.7	26	0.8	53	0.8	79	0.8
Ireland	15	0.9	34	1.3	61	1.5	84	1.2
Italy	6	0.5	18	0.9	44	1.3	73	1.3
Japan	11	1.2	30	2.1	61	2.5	85	1.9
Korea, Republic of	6	0.7	26	1.4	63	1.5	89	1.0
Luxembourg	2	0.3	9	0.6	27	0.7	55	0.9
Mexico	1	0.2	4	0.7	17	1.4	43	1.8
New Zealand	19	1.0	38	1.1	60	1.2	81	0.9
Norway	12	0.7	28	1.0	53	1.2	76	1.1
Poland	6	1.0	19	1.8	41	2.1	69	1.7
Portugal	5	0.6	15	1.2	38	1.9	65	2.0
Spain	5	0.4	18	0.9	46	1.4	75	1.4
Sweden	12	0.7	29	1.1	57	1.1	81	0.8
Switzerland	10	1.1	24	1.6	48	1.8	72	1.6
United Kingdom	16	1.0	33	1.2	58	1.0	81	0.8
United States	13	1.4	27	2.1	51	2.8	75	2.5
OECD average	10	0.7	25	1.2	50	1.4	75	1.3
Non-OECD countries								
Brazil	1	0.2	2	0.4	10	0.8	32	1.4
Latvia	4	0.7	13	1.4	33	2.0	60	2.2
Liechtenstein	5	1.5	18	2.0	43	3.2	71	2.0
Russian Federation	3	0.5	12	1.0	32	1.7	62	1.9

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.5.—Percentage distribution and standard errors of 15-year-olds by combined reading literacy level, by country: 2000

Country	Below level 1		Level 1		Level 2		Level 3		Level 4		Level 5	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Australia	3	0.5	9	0.8	19	1.1	26	1.1	25	0.9	18	1.2
Austria	4	0.4	10	0.6	22	0.9	30	1.2	25	1.0	9	0.8
Belgium	8	1.0	11	0.7	17	0.7	26	0.9	26	0.9	12	0.7
Canada	2	0.3	7	0.3	18	0.4	28	0.5	28	0.6	17	0.5
Czech Republic	6	0.6	11	0.7	25	1.2	31	1.1	20	0.8	7	0.6
Denmark	6	0.6	12	0.7	23	0.9	29	1.0	22	0.9	8	0.5
Finland	2	0.5	5	0.4	14	0.7	29	0.8	32	0.9	18	0.9
France	4	0.6	11	0.8	22	0.8	31	1.0	24	0.9	8	0.6
Germany	10	0.7	13	0.6	22	0.8	27	1.0	19	1.0	9	0.5
Greece	9	1.2	16	1.4	26	1.4	28	1.7	17	1.4	5	0.7
Hungary	7	0.7	16	1.2	25	1.1	29	1.3	18	1.1	5	0.8
Iceland	4	0.3	11	0.6	22	0.8	31	0.9	24	1.1	9	0.7
Ireland	3	0.5	8	0.8	18	0.9	30	1.1	27	1.1	14	0.8
Italy	5	0.9	14	0.9	26	1.0	31	1.0	19	1.1	5	0.5
Japan	3	0.6	7	1.1	18	1.3	33	1.3	29	1.7	10	1.1
Korea, Republic of	1	0.2	5	0.6	19	0.9	39	1.1	31	1.2	6	0.6
Luxembourg	14	0.7	21	0.8	27	1.3	25	1.1	11	0.5	2	0.3
Mexico	16	1.2	28	1.4	30	1.1	19	1.2	6	0.7	1	0.2
New Zealand	5	0.5	9	0.5	17	0.9	25	1.1	26	1.1	19	1.0
Norway	6	0.6	11	0.8	20	0.8	28	0.8	24	0.9	11	0.7
Poland	9	1.0	15	1.0	24	1.4	28	1.3	19	1.3	6	1.0
Portugal	10	1.0	17	1.2	25	1.0	27	1.2	17	1.1	4	0.5
Spain	4	0.5	12	0.9	26	0.7	33	1.0	21	0.9	4	0.5
Sweden	3	0.4	9	0.6	20	0.7	30	1.0	26	1.0	11	0.7
Switzerland	7	0.7	13	0.9	21	1.0	28	1.0	21	1.0	9	1.0
United Kingdom	4	0.4	9	0.5	20	0.7	27	0.9	24	0.9	16	1.0
United States	6	1.2	12	1.2	21	1.2	27	1.3	21	1.4	12	1.4
OECD average	6	0.1	12	0.2	22	0.2	29	0.2	22	0.2	9	0.1
Non-OECD countries												
Brazil	23	1.4	33	1.2	28	1.3	13	1.1	3	0.5	1	0.2
Latvia	13	1.3	18	1.3	26	1.1	25	1.3	14	1.1	4	0.6
Liechtenstein	8	1.5	15	2.1	23	2.9	30	3.4	19	2.2	5	1.6
Russian Federation	9	1.0	18	1.1	29	0.8	27	1.1	13	1.0	3	0.5

NOTE: PISA uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.6.—Percentage distribution and standard errors of 15-year-olds by retrieving information level, by country: 2000

	Below level 1		Level 1		Level 2		Level 3		Level 4		Level 5	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Australia	4	0.4	9	0.8	17	1.0	25	1.0	25	1.0	21	1.2
Austria	5	0.5	11	0.7	23	0.9	29	1.0	23	0.9	9	0.7
Belgium	9	1.0	10	0.6	15	0.7	22	0.8	25	0.9	18	0.7
Canada	3	0.3	8	0.3	18	0.5	27	0.6	26	0.6	17	0.6
Czech Republic	9	0.7	14	0.8	24	0.8	27	0.8	18	1.0	8	0.6
Denmark	7	0.7	12	0.6	21	0.8	28	0.8	22	0.8	10	0.7
Finland	2	0.5	6	0.4	14	0.9	24	1.2	28	0.8	26	0.9
France	5	0.6	10	0.9	19	0.8	27	0.9	25	1.1	13	1.0
Germany	11	0.8	13	0.7	22	0.9	27	1.1	19	1.0	9	0.5
Greece	15	1.6	18	1.1	25	1.2	24	1.2	14	1.0	4	0.6
Hungary	10	0.9	16	1.1	23	0.9	25	1.2	18	1.2	8	0.9
Iceland	6	0.4	12	0.6	22	0.9	28	1.2	21	0.9	11	0.6
Ireland	4	0.5	9	0.7	18	0.9	28	1.0	26	0.9	15	0.8
Italy	8	0.8	13	0.8	23	0.9	28	0.9	19	0.9	8	0.6
Japan	4	0.8	8	1.0	17	1.1	30	1.1	27	1.3	15	1.2
Korea, Republic of	1	0.3	6	0.6	19	0.9	32	1.0	30	1.0	12	0.8
Luxembourg	18	0.7	21	0.9	25	0.8	22	0.9	11	0.8	2	0.4
Mexico	26	1.4	26	1.3	25	1.0	16	1.1	6	0.8	1	0.3
New Zealand	6	0.5	9	0.6	16	0.7	23	1.2	25	1.1	22	1.0
Norway	7	0.6	11	0.6	19	0.9	27	1.3	23	1.2	13	0.8
Poland	12	1.1	15	1.0	23	1.2	24	1.1	18	1.3	8	1.2
Portugal	14	1.3	18	1.1	24	1.0	25	1.2	15	1.0	4	0.5
Spain	6	0.6	14	1.0	26	0.8	30	1.0	19	0.9	5	0.4
Sweden	5	0.4	10	0.8	20	0.9	27	0.9	24	0.9	15	0.8
Switzerland	9	0.8	12	0.8	19	0.9	26	1.1	22	0.5	12	1.1
United Kingdom	4	0.4	9	0.6	19	0.7	27	0.9	24	0.9	17	0.9
United States	8	1.4	12	1.1	21	1.0	26	1.2	21	1.4	13	1.4
OECD average	8	0.2	12	0.2	21	0.2	26	0.2	21	0.2	12	0.2
Non-OECD countries												
Brazil	37	1.6	30	1.3	20	1.2	9	0.6	2	0.5	#	0.2
Latvia	17	1.6	18	1.2	24	1.1	22	1.0	14	1.1	6	0.7
Liechtenstein	9	1.6	13	2.1	20	2.5	28	3.6	22	3.6	9	1.6
Russian Federation	14	1.3	19	0.8	26	0.8	23	1.0	12	0.9	5	0.6

#Too small to report.

NOTE: The Program for International Student Assessment (PISA) uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores. Although the Netherlands participated in PISA in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.7.—Percentage distribution and standard errors of 15-year-olds by interpreting texts level, by country: 2000

	Below level 1		**Level 1**		**Level 2**		**Level 3**		**Level 4**		**Level 5**	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Australia	4	0.4	10	0.7	19	1.0	26	1.1	24	1.2	18	1.3
Austria	4	0.4	11	0.6	22	1.0	30	1.1	24	1.0	10	0.8
Belgium	6	0.7	11	0.8	18	0.7	25	0.9	26	0.9	13	0.7
Canada	2	0.2	8	0.4	18	0.4	29	0.6	26	0.5	16	0.5
Czech Republic	5	0.6	11	0.6	23	0.9	30	0.7	22	0.9	9	0.7
Denmark	6	0.6	13	0.8	23	0.8	29	0.9	21	1.0	8	0.7
Finland	2	0.5	5	0.4	14	0.8	26	0.9	30	0.9	24	0.9
France	4	0.5	12	0.8	22	0.9	30	1.0	23	1.1	9	0.7
Germany	9	0.8	13	0.9	22	1.0	26	1.0	20	0.7	9	0.5
Greece	7	1.1	16	1.4	27	1.2	30	1.5	16	1.2	4	0.6
Hungary	6	0.7	16	1.3	26	1.1	30	1.3	18	1.1	4	0.6
Iceland	4	0.4	10	0.6	21	0.7	29	1.1	24	1.0	12	0.6
Ireland	3	0.5	8	0.7	18	0.9	29	1.1	26	1.1	15	1.0
Italy	4	0.7	13	0.8	27	1.2	32	1.3	19	0.9	5	0.4
Japan	2	0.7	8	1.1	20	1.4	34	1.5	27	1.6	8	1.0
Korea, Republic of	1	0.2	5	0.6	20	1.0	39	1.4	30	1.2	6	0.6
Luxembourg	14	0.6	20	0.9	28	1.0	24	0.9	12	0.6	2	0.4
Mexico	15	0.9	31	1.5	32	1.3	18	1.2	4	0.6	#	0.1
New Zealand	5	0.5	10	0.7	18	0.7	24	1.1	24	0.9	19	0.9
Norway	6	0.5	11	0.8	20	0.7	28	0.8	23	0.9	11	0.7
Poland	7	0.9	15	0.9	25	1.4	29	1.3	19	1.3	6	0.9
Portugal	8	0.9	17	1.3	27	1.1	28	1.2	17	1.1	4	0.5
Spain	4	0.5	13	0.9	27	0.8	33	1.1	20	0.8	4	0.4
Sweden	3	0.3	9	0.6	20	0.8	29	1.0	25	1.0	14	0.8
Switzerland	7	0.6	13	0.9	22	0.9	27	1.1	21	1.0	9	1.1
United Kingdom	4	0.5	11	0.6	21	0.7	27	0.7	23	0.9	14	0.9
United States	6	1.2	12	1.1	22	1.2	26	1.2	21	1.5	13	1.3
OECD average	6	0.1	12	0.2	22	0.2	28	0.3	22	0.2	10	0.1
Non-OECD countries												
Brazil	21	1.3	33	1.4	28	1.5	13	1.0	3	0.5	1	0.2
Latvia	11	1.2	19	1.4	27	1.3	27	1.2	13	1.2	3	0.6
Liechtenstein	7	1.7	15	2.7	24	3.3	30	3.0	20	2.3	5	1.2
Russian Federation	8	0.9	18	0.8	28	0.9	28	1.1	14	1.1	4	0.6

#Too small to report.

NOTE: The Program for International Student Assessment (PISA) uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores. Although the Netherlands participated in PISA in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.8.—Percentage distribution and standard errors of 15-year-olds by reflecting on texts level, by country: 2000

Country	Below level 1		Level 1		Level 2		Level 3		Level 4		Level 5	
	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Australia	3	0.4	9	0.7	19	0.9	27	1.2	26	1.2	16	1.2
Austria	5	0.5	10	0.5	20	0.9	28	1.1	25	1.3	12	1.0
Belgium	10	1.2	11	0.8	18	0.7	26	1.0	24	0.8	11	0.6
Canada	2	0.2	7	0.4	16	0.4	27	0.5	28	0.5	19	0.5
Czech Republic	8	0.7	13	0.9	25	0.9	28	0.8	19	1.0	7	0.7
Denmark	6	0.6	12	0.7	21	0.8	29	1.0	22	0.8	10	0.8
Finland	2	0.5	6	0.5	16	0.7	30	0.9	31	0.9	14	0.7
France	6	0.7	12	0.8	23	0.8	29	1.1	21	1.0	9	0.6
Germany	13	0.8	14	0.7	20	1.1	24	0.9	19	0.8	10	0.6
Greece	9	1.1	13	1.1	22	1.1	24	1.1	20	1.2	13	1.1
Hungary	8	0.8	15	1.3	24	1.3	28	1.1	19	1.2	6	0.8
Iceland	5	0.5	11	0.6	23	0.8	31	0.9	22	0.8	8	0.5
Ireland	2	0.4	7	0.8	17	1.0	30	1.0	29	1.0	14	0.9
Italy	8	0.9	14	1.1	24	1.3	28	1.0	19	0.8	7	0.6
Japan	4	0.8	8	0.9	17	1.1	28	1.1	27	1.2	16	1.4
Korea, Republic of	1	0.3	5	0.5	19	1.0	37	1.2	30	1.2	8	0.7
Luxembourg	17	0.7	18	0.8	25	1.1	23	0.8	13	0.5	4	0.4
Mexico	16	0.9	21	1.0	26	0.9	21	0.8	12	0.9	5	0.6
New Zealand	5	0.5	9	0.6	17	0.9	25	1.2	26	1.0	18	1.2
Norway	7	0.7	11	0.7	19	0.8	27	0.9	24	1.0	12	0.8
Poland	11	1.1	14	1.2	23	1.8	26	1.4	18	1.3	8	1.1
Portugal	9	0.9	15	1.2	24	1.2	26	1.1	19	1.1	6	0.7
Spain	4	0.4	11	0.7	22	1.1	31	1.2	24	0.9	8	0.6
Sweden	4	0.4	10	0.6	21	0.7	30	0.8	24	0.9	10	0.7
Switzerland	10	0.9	14	0.9	22	1.1	25	1.0	19	0.9	11	1.1
United Kingdom	3	0.3	7	0.6	17	0.7	27	0.7	27	0.9	20	1.0
United States	6	1.1	11	1.2	21	1.1	27	1.1	22	1.7	13	1.3
OECD average	7	0.1	11	0.2	21	0.2	28	0.2	23	0.2	11	0.2
Non-OECD countries												
Brazil	19	1.2	27	1.1	29	1.1	18	1.0	6	0.7	1	0.2
Latvia	16	1.5	17	1.1	23	1.6	24	1.6	14	1.2	6	0.9
Liechtenstein	12	2.0	16	3.1	24	3.3	25	2.8	17	2.9	6	1.3
Russian Federation	12	1.1	19	1.0	28	1.1	25	0.9	12	0.8	4	0.5

NOTE: The Program for International Student Assessment (PISA) uses five levels of performance to describe student performance. In order to reach a particular level, a student must be able to correctly answer a majority of items at that level. Students were classified into reading levels according to their scores. Although the Netherlands participated in PISA in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.9.—Mathematics literacy and science literacy averages of 15-year-olds with standard errors, by country: 2000

	Mathematics literacy		Science literacy	
Country	Average	s.e.	Average	s.e.
Australia	533	3.5	528	3.5
Austria	515	2.5	519	2.5
Belgium	520	3.9	496	4.3
Canada	533	1.4	529	1.6
Czech Republic	498	2.8	511	2.4
Denmark	514	2.4	481	2.8
Finland	536	2.1	538	2.5
France	517	2.7	500	3.2
Germany	490	2.5	487	2.4
Greece	447	5.6	461	4.9
Hungary	488	4.0	496	4.2
Iceland	514	2.3	496	2.2
Ireland	503	2.7	513	3.2
Italy	457	2.9	478	3.1
Japan	557	5.5	550	5.5
Korea, Republic of	547	2.8	552	2.7
Luxembourg	446	2.0	443	2.3
Mexico	387	3.4	422	3.2
New Zealand	537	3.1	528	2.4
Norway	499	2.8	500	2.7
Poland	470	5.5	483	5.1
Portugal	454	4.1	459	4.0
Spain	476	3.1	491	3.0
Sweden	510	2.5	512	2.5
Switzerland	529	4.4	496	4.4
United Kingdom	529	2.5	532	2.7
United States	493	7.6	499	7.3
OECD average	500	0.7	500	0.6
Non-OECD countries				
Brazil	334	3.7	375	3.3
Latvia	463	4.5	460	5.6
Liechtenstein	514	7.0	476	7.1
Russian Federation	478	5.5	460	4.7

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being included with the other OECD countries. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.10.—Average mathematics literacy scores of 15-year-olds by percentiles with standard errors, by country: 2000

Country	Average	s.e.	Standard deviation	s.e.	5th percentile		10th percentile		25th percentile		75th percentile		90th percentile		95th percentile	
					Score	s.e.	Score	s.e.	Score	s.e.	Score	s.e.	Score	s.e.	Score	s.e.
Australia	533	3.5	90	1.6	380	6.4	418	6.4	474	4.4	594	4.5	647	5.7	679	5.8
Austria	515	2.5	92	1.7	355	5.3	392	4.6	455	3.5	581	3.8	631	3.6	661	5.2
Belgium	520	3.9	106	2.9	322	11.0	367	8.6	453	6.5	597	3.0	646	3.9	672	3.5
Canada	533	1.4	85	1.1	390	3.2	423	2.5	477	2.0	592	1.7	640	1.9	668	2.6
Czech Republic	498	2.8	96	1.9	335	5.4	372	4.2	433	4.1	564	3.9	623	4.8	655	5.6
Denmark	514	2.4	87	1.7	366	6.1	401	5.1	458	3.1	575	3.1	621	3.7	649	4.6
Finland	536	2.2	80	1.4	400	6.5	433	3.6	484	4.1	592	2.5	637	3.2	664	3.5
France	517	2.7	89	1.9	364	6.4	399	5.4	457	4.7	581	3.1	629	3.2	656	4.6
Germany	490	2.5	103	2.4	311	7.9	349	6.9	423	3.9	563	2.7	619	3.6	649	3.9
Greece	447	5.6	108	2.9	260	9.0	303	8.1	375	8.1	524	6.7	586	7.8	617	8.6
Hungary	488	4.0	98	2.4	327	7.1	360	5.7	419	4.8	558	5.2	615	6.4	648	6.9
Iceland	514	2.3	85	1.4	372	5.7	407	4.7	459	3.5	572	3.0	622	3.1	649	5.5
Ireland	503	2.7	84	1.8	357	6.4	394	4.7	449	4.1	561	3.6	606	4.3	630	5.0
Italy	457	2.9	90	2.4	301	8.4	338	5.5	398	3.5	520	3.5	570	4.4	600	6.1
Japan	557	5.5	87	3.1	402	11.2	440	9.1	504	7.4	617	5.2	662	4.9	688	6.1
Korea, Republic of	547	2.8	84	2.0	400	6.1	438	5.0	493	4.2	606	3.4	650	4.3	676	5.3
Luxembourg	446	2.0	93	1.8	281	7.4	328	4.2	390	3.8	509	3.4	559	3.2	588	3.9
Mexico	387	3.4	83	1.9	254	5.5	281	3.6	329	4.1	445	5.2	496	5.6	527	6.6
New Zealand	537	3.1	99	1.9	364	6.1	405	5.4	472	3.9	607	4.0	659	4.2	689	5.2
Norway	499	2.8	92	1.7	340	7.0	379	5.2	439	4.0	565	3.9	613	4.5	643	4.5
Poland	470	5.5	103	3.8	296	12.2	335	9.2	402	7.0	542	6.8	599	7.7	632	8.5
Portugal	454	4.1	91	1.8	297	7.3	332	6.1	392	5.7	520	4.3	570	4.3	596	5.0
Spain	476	3.1	91	1.5	323	5.8	358	4.3	416	5.3	540	4.0	592	3.9	621	3.1
Sweden	510	2.5	93	1.6	347	5.8	386	4.0	450	3.3	574	2.6	626	3.3	656	5.5
Switzerland	529	4.4	100	2.2	353	9.1	398	6.0	466	4.8	601	5.2	653	5.8	682	4.8
United Kingdom	529	2.5	92	1.6	374	5.9	412	3.6	470	3.2	592	3.2	646	4.3	676	5.9
United States	493	7.6	98	2.4	327	11.7	361	9.6	427	9.7	562	7.5	620	7.7	652	7.9
OECD average	500	0.7	100	0.4	326	1.5	367	1.4	435	1.1	571	0.8	625	0.9	655	1.1
Non-OECD countries																
Brazil	334	3.7	97	2.3	179	5.5	212	5.2	266	4.2	399	5.5	464	7.5	499	8.9
Latvia	463	4.5	103	2.6	288	9.0	328	8.9	393	5.7	536	6.2	593	5.6	625	6.6
Liechtenstein	514	7.0	96	6.0	343	19.7	380	18.9	454	15.5	579	7.5	635	16.9	665	15.0
Russian Federation	478	5.5	104	2.5	305	9.0	343	7.4	407	6.6	552	6.6	613	6.8	648	7.8

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.11.—Average science literacy scores of 15-year-olds by percentiles with standard errors, by country: 2000

Country	Average	s.e.	Standard deviation	s.e.	5th percentile Score	s.e.	10th percentile Score	s.e.	25th percentile Score	s.e.	75th percentile Score	s.e.	90th percentile Score	s.e.	95th percentile Score	s.e.
Australia	528	3.5	94	1.6	368	5.1	402	4.7	463	4.6	596	4.8	646	5.1	675	4.8
Austria	519	2.6	91	1.7	363	5.7	398	4.0	456	3.8	584	3.5	633	4.1	659	4.3
Belgium	496	4.3	111	3.8	292	13.5	346	10.2	424	6.6	577	3.5	630	2.6	656	3.0
Canada	529	1.6	89	1.1	380	3.7	412	3.4	469	2.2	592	1.8	641	2.2	670	3.0
Czech Republic	511	2.4	94	1.5	355	5.6	389	4.0	449	3.6	577	3.8	632	4.1	663	4.9
Denmark	481	2.8	103	2.0	310	6.0	347	5.3	410	4.8	554	3.5	613	4.4	645	4.7
Finland	538	2.5	86	1.2	391	5.2	425	4.2	481	3.5	598	3.0	645	4.3	674	4.3
France	500	3.2	102	2.0	329	6.1	363	5.4	429	5.3	575	4.0	631	4.2	663	4.9
Germany	487	2.4	102	2.0	314	9.5	350	6.0	417	4.9	560	3.3	618	3.5	649	4.7
Greece	461	4.9	97	2.6	300	9.3	334	8.3	393	7.0	530	5.3	585	5.3	616	5.8
Hungary	496	4.2	103	2.3	328	7.5	361	4.9	423	5.5	570	4.8	629	5.1	659	8.5
Iceland	496	2.2	88	1.6	351	7.0	381	4.3	436	3.7	558	3.1	607	4.1	635	4.8
Ireland	513	3.2	92	1.7	361	6.5	394	5.7	450	4.4	578	3.4	630	4.6	661	5.4
Italy	478	3.1	98	2.6	315	7.1	349	6.2	411	4.4	547	3.5	602	4.0	633	4.4
Japan	550	5.5	90	3.0	391	11.3	430	9.9	495	7.2	612	5.0	659	4.7	688	5.7
Korea, Republic of	552	2.7	81	1.8	411	5.3	442	5.3	499	4.0	610	3.4	652	3.9	674	5.7
Luxembourg	443	2.3	96	2.0	278	7.2	320	6.8	382	3.4	510	2.8	563	4.4	593	4.0
Mexico	422	3.2	77	2.1	303	4.8	325	4.6	368	3.1	472	4.7	525	5.5	554	7.0
New Zealand	528	2.4	101	2.3	357	5.6	392	5.2	459	3.8	600	3.4	653	5.0	683	5.1
Norway	500	2.8	96	2.0	338	7.3	377	6.6	437	4.0	569	3.5	619	3.9	649	6.2
Poland	483	5.1	97	2.7	326	9.2	359	5.8	415	5.5	553	7.3	610	7.6	639	7.5
Portugal	459	4.0	89	1.6	317	5.0	343	5.1	397	5.2	521	4.7	575	5.0	604	5.3
Spain	491	3.0	95	1.8	333	5.1	367	4.3	425	4.4	558	3.5	613	3.9	643	5.5
Sweden	512	2.5	93	1.4	357	5.7	390	4.6	446	4.1	578	3.0	630	3.4	660	4.5
Switzerland	496	4.4	100	2.4	332	5.8	366	5.4	427	5.1	567	6.4	626	6.4	656	9.0
United Kingdom	532	2.7	98	2.0	366	6.8	401	6.0	466	3.8	602	3.9	656	4.7	687	5.0
United States	499	7.3	101	2.9	330	11.7	368	10.0	430	9.6	571	8.0	628	7.0	658	8.4
OECD average	500	0.7	100	0.5	332	1.5	368	1.0	431	1.0	572	0.8	627	0.8	657	1.2
Non-OECD countries																
Brazil	375	3.3	90	2.3	230	5.5	262	5.9	315	3.7	432	4.9	492	7.8	531	8.2
Latvia	460	5.6	98	3.0	299	10.1	334	8.8	393	7.7	528	5.7	585	7.2	620	8.0
Liechtenstein	476	7.1	94	5.4	314	23.5	357	20.0	409	12.3	543	12.7	595	12.4	629	24.0
Russian Federation	460	4.7	99	2.0	298	6.5	333	5.4	392	6.2	529	5.8	591	5.9	625	5.7

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.12.—Percentage of 15-year-olds reaching PISA international benchmarks in mathematics literacy with standard errors, by country: 2000

	Top 10 percent		Top 25 percent		Top 50 percent		Top 75 percent	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Australia	15	1.4	34	1.9	63	1.6	87	1.1
Austria	11	0.9	29	1.4	56	1.5	82	1.1
Belgium	16	1.0	35	1.2	60	1.6	79	1.6
Canada	14	0.5	34	0.7	63	0.8	88	0.6
Czech Republic	10	0.9	23	1.3	47	1.5	75	1.1
Denmark	9	0.9	27	1.2	56	1.4	83	1.1
Finland	13	0.8	34	1.2	66	1.4	90	0.7
France	11	0.8	29	1.1	57	1.5	82	1.1
Germany	9	0.7	22	0.9	47	1.3	72	1.1
Greece	4	0.9	13	1.5	31	2.0	57	2.3
Hungary	8	1.0	21	1.6	44	1.9	70	1.7
Iceland	9	0.8	26	1.2	55	1.6	84	1.0
Ireland	6	0.7	21	1.2	51	1.5	80	1.3
Italy	2	0.5	10	0.9	31	1.3	62	1.4
Japan	22	1.9	46	2.6	74	2.3	91	1.4
Korea, Republic of	17	1.2	41	1.6	71	1.3	91	0.7
Luxembourg	2	0.3	8	0.6	26	1.1	58	1.5
Mexico	#	0.1	1	0.3	8	1.0	29	1.9
New Zealand	19	1.1	39	1.6	64	1.4	85	1.1
Norway	8	0.7	23	1.2	49	1.3	77	1.2
Poland	6	1.1	16	2.0	38	2.4	65	2.0
Portugal	2	0.4	10	0.9	30	1.7	60	2.0
Spain	4	0.5	15	1.1	38	1.5	69	1.7
Sweden	10	0.7	26	1.0	54	1.2	80	1.1
Switzerland	17	1.5	36	2.0	61	2.0	83	1.2
United Kingdom	15	1.2	33	1.4	61	1.1	85	0.9
United States	9	1.3	22	2.3	46	3.3	73	2.9
OECD average	10	0.9	25	1.3	50	1.6	75	1.4
Non-OECD countries								
Brazil	#	0.1	1	0.3	4	0.8	16	1.5
Latvia	5	0.9	15	1.3	35	2.0	62	1.8
Liechtenstein	12	3.1	30	3.6	56	4.0	80	3.4
Russian Federation	8	1.1	20	1.7	40	2.2	67	2.0

#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

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Table A3.13.– Percentage of 15-year-olds reaching PISA international benchmarks in science literacy with standard errors, by country: 2000

	Top 10 percent		Top 25 percent		Top 50 percent		Top 75 percent	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Australia	15	1.2	34	1.6	60	1.9	84	1.1
Austria	11	0.9	30	1.3	58	1.6	83	1.2
Belgium	11	0.7	27	1.1	51	1.5	73	1.5
Canada	14	0.5	33	0.8	62	0.7	86	0.7
Czech Republic	11	0.9	27	1.2	54	1.3	80	1.0
Denmark	8	0.7	20	1.0	43	1.3	68	1.4
Finland	15	0.9	36	1.1	66	1.4	89	0.7
France	11	0.7	26	1.2	50	1.4	74	1.4
Germany	8	0.6	21	0.9	45	1.2	70	1.2
Greece	4	0.6	13	1.3	35	1.9	62	2.2
Hungary	10	1.1	24	1.4	48	1.9	73	1.7
Iceland	6	0.6	20	1.2	48	1.5	77	1.3
Ireland	11	0.8	27	1.3	55	1.7	81	1.3
Italy	6	0.6	17	1.0	41	1.5	69	1.4
Japan	20	1.8	43	2.5	72	2.4	90	1.6
Korea, Republic of	18	1.2	43	1.6	73	1.3	92	0.8
Luxembourg	2	0.3	8	0.9	27	1.3	57	1.2
Mexico	1	0.3	3	0.6	15	1.4	43	2.0
New Zealand	16	0.9	36	1.2	61	1.3	82	1.1
Norway	8	0.8	24	1.1	50	1.4	77	1.3
Poland	7	1.0	19	2.1	43	2.6	69	1.9
Portugal	3	0.5	11	1.1	32	1.8	62	2.1
Spain	7	0.6	21	1.1	46	1.5	73	1.3
Sweden	11	0.7	28	1.2	55	1.3	79	1.0
Switzerland	10	1.1	23	1.8	47	2.0	73	1.6
United Kingdom	17	1.1	35	1.3	62	1.2	84	1.2
United States	10	1.5	25	2.4	49	3.1	75	2.7
OECD average	10	0.8	25	1.3	50	1.6	75	1.4
Non-OECD countries								
Brazil	#	0.2	2	0.4	8	1.3	25	1.6
Latvia	4	0.8	13	1.5	33	2.3	62	2.5
Liechtenstein	4	2.8	18	3.3	41	4.1	66	3.5
Russian Federation	5	0.7	14	1.2	33	1.9	61	2.0

#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.14.—Combined reading literacy averages by gender with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Female		**Male**		**Female**		**Male**			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	48	2.2	53	2.2	546	4.7	513	4.0	34	5.4
Austria	52	2.4	48	2.4	520	3.6	495	3.2	26	5.2
Belgium	48	1.7	52	1.7	525	4.9	492	4.2	33	6.0
Canada	50	0.5	50	0.5	551	1.7	519	1.8	32	1.6
Czech Republic	52	1.8	48	1.8	510	2.5	473	4.1	37	4.7
Denmark	50	0.9	50	0.9	510	2.9	485	3.0	25	3.3
Finland	51	0.8	49	0.8	571	2.8	520	3.0	51	2.6
France	51	1.3	49	1.3	519	2.7	490	3.5	29	3.4
Germany	50	1.5	50	1.5	502	3.9	468	3.2	35	5.2
Greece	50	1.3	50	1.3	493	4.6	456	6.1	37	5.0
Hungary	50	2.1	50	2.1	496	4.3	465	5.3	32	5.7
Iceland	50	0.8	50	0.8	528	2.1	488	2.1	40	3.1
Ireland	50	1.8	50	1.8	542	3.6	513	4.2	29	4.6
Italy	49	2.7	51	2.7	507	3.6	469	5.1	38	7.0
Japan	51	2.4	49	2.4	537	5.4	507	6.7	30	6.4
Korea, Republic of	44	3.5	56	3.5	533	3.7	519	3.8	14	6.0
Luxembourg	50	0.9	50	0.9	456	2.3	429	2.6	27	3.8
Mexico	50	1.2	50	1.2	432	3.8	411	4.2	20	4.3
New Zealand	50	2.4	50	2.4	553	3.8	507	4.2	46	6.3
Norway	49	0.9	51	0.9	529	2.9	486	3.8	43	4.0
Poland	49	2.6	51	2.6	498	5.5	461	6.0	36	7.0
Portugal	52	0.9	48	0.9	482	4.6	458	5.0	25	3.8
Spain	51	1.3	49	1.3	505	2.8	481	3.4	24	3.2
Sweden	49	0.9	51	0.9	536	2.5	499	2.6	37	2.7
Switzerland	50	1.0	50	1.0	510	4.5	480	4.9	30	4.2
United Kingdom	50	1.3	50	1.3	537	3.4	512	3.0	26	4.3
United States	52	1.0	48	1.0	518	6.2	490	8.4	29	4.1
OECD average	50	0.3	50	0.3	517	0.7	485	0.8	32	0.9
Non-OECD countries										
Brazil	54	1.2	46	1.2	404	3.4	388	3.9	17	4.0
Latvia	51	1.6	49	1.6	485	5.4	432	5.5	53	4.2
Liechtenstein	50	2.9	50	2.9	500	6.8	468	7.3	31	11.5
Russian Federation	50	0.9	50	0.9	481	4.1	443	4.5	38	2.9

NOTE: Gender difference is calculated by subtracting average scores of males from average scores of females. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.15.—Averages on the retrieving information reading literacy subscale by gender with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Female		Male		Female		Male			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	48	2.2	53	2.2	551	5.0	523	4.3	28	5.7
Austria	52	2.4	48	2.4	510	3.6	495	3.3	16	5.4
Belgium	48	1.7	52	1.7	529	5.4	504	4.7	25	6.6
Canada	50	0.5	50	0.5	543	1.8	519	1.9	25	1.8
Czech Republic	52	1.8	48	1.8	495	2.8	467	4.7	27	5.4
Denmark	50	0.9	50	0.9	506	3.2	491	3.4	14	3.5
Finland	51	0.8	49	0.8	578	3.1	534	3.4	44	3.4
France	51	1.3	49	1.3	527	3.0	503	3.8	23	3.6
Germany	50	1.5	50	1.5	497	4.0	471	3.0	26	5.2
Greece	50	1.3	50	1.3	466	5.0	435	6.7	32	5.6
Hungary	50	2.1	50	2.1	491	4.8	465	6.0	25	6.3
Iceland	50	0.8	50	0.8	517	2.2	485	2.4	32	3.3
Ireland	50	1.8	50	1.8	536	3.6	514	4.2	22	4.7
Italy	49	2.7	51	2.7	504	4.0	474	5.7	31	7.8
Japan	51	2.4	49	2.4	539	5.8	512	7.0	27	6.8
Korea, Republic of	44	3.5	56	3.5	489	6.2	461	6.6	28	7.8
Luxembourg	50	0.9	50	0.9	444	2.5	424	2.6	20	4.0
Mexico	50	1.2	50	1.2	408	4.4	396	5.0	12	5.1
New Zealand	50	2.4	50	2.4	555	4.1	516	4.7	39	7.1
Norway	49	0.9	51	0.9	523	2.9	490	3.9	32	4.0
Poland	49	2.6	51	2.6	489	6.2	461	6.6	28	7.8
Portugal	52	0.9	48	0.9	464	5.0	447	5.5	16	4.2
Spain	51	1.3	49	1.3	493	3.1	477	3.7	16	3.8
Sweden	49	0.9	51	0.9	532	2.9	501	2.7	30	3.2
Switzerland	50	1.0	50	1.0	510	4.7	487	5.2	22	4.7
United Kingdom	50	1.3	50	1.3	534	3.4	515	3.1	19	4.4
United States	52	1.0	48	1.0	512	6.5	486	8.8	26	4.5
OECD average	50	0.3	50	0.3	510	0.8	486	0.9	24	1.1
Non-OECD countries										
Brazil	54	1.2	46	1.2	370	4.0	360	4.3	10	4.5
Latvia	51	1.6	49	1.6	474	6.0	428	6.1	46	4.9
Liechtenstein	50	2.9	50	2.9	504	7.7	484	8.2	20	12.3
Russian Federation	50	0.9	50	0.9	468	4.8	434	5.5	34	3.7

NOTE: Average score difference is calculated by subtracting scores of males from scores of females. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.16.—Averages on the interpreting texts reading literacy subscale by gender with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Female		Male		Female		Male			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	48	2.2	53	2.2	545	4.9	511	4.1	34	5.7
Austria	52	2.4	48	2.4	520	3.8	497	3.1	23	5.3
Belgium	48	1.7	52	1.7	529	4.7	498	3.9	31	6.1
Canada	50	0.5	50	0.5	547	1.7	518	1.8	29	1.6
Czech Republic	52	1.8	48	1.8	517	2.6	483	4.1	34	4.6
Denmark	50	0.9	50	0.9	506	2.9	485	3.1	21	3.4
Finland	51	0.8	49	0.8	579	3.2	529	3.3	51	3.1
France	51	1.3	49	1.3	519	2.7	492	3.5	27	3.3
Germany	50	1.5	50	1.5	505	3.8	472	2.9	33	4.8
Greece	50	1.3	50	1.3	492	4.2	459	5.5	33	4.6
Hungary	50	2.1	50	2.1	494	4.1	466	5.1	28	5.4
Iceland	50	0.8	50	0.8	535	2.1	497	2.1	38	3.0
Ireland	50	1.8	50	1.8	541	3.6	513	4.3	27	4.7
Italy	49	2.7	51	2.7	509	3.3	470	4.6	39	6.4
Japan	51	2.4	49	2.4	530	5.3	505	6.3	25	6.1
Korea, Republic of	44	3.5	56	3.5	500	5.5	465	5.5	35	6.6
Luxembourg	50	0.9	50	0.9	460	2.3	433	2.6	27	3.9
Mexico	50	1.2	50	1.2	427	3.3	410	3.8	17	3.9
New Zealand	50	2.4	50	2.4	549	3.9	506	4.3	43	6.6
Norway	49	0.9	51	0.9	527	2.7	487	3.7	40	3.8
Poland	49	2.6	51	2.6	500	5.5	465	5.5	35	6.6
Portugal	52	0.9	48	0.9	485	4.3	461	4.7	24	3.5
Spain	51	1.3	49	1.3	502	2.8	481	3.3	21	3.4
Sweden	49	0.9	51	0.9	540	2.5	505	2.5	34	2.8
Switzerland	50	1.0	50	1.0	510	4.4	484	4.8	26	4.2
United Kingdom	50	1.3	50	1.3	527	3.5	503	2.9	24	4.3
United States	52	1.0	48	1.0	518	6.4	491	8.4	27	4.2
OECD average	50	0.3	50	0.3	516	0.7	487	0.8	29	0.9
Non-OECD countries										
Brazil	54	1.2	46	1.2	408	3.5	393	3.8	14	4.1
Latvia	51	1.6	49	1.6	485	5.0	434	5.0	51	3.8
Liechtenstein	50	2.9	50	2.9	497	6.9	474	7.8	23	11.6
Russian Federation	50	0.9	50	0.9	486	3.9	450	4.4	36	3.1

NOTE: Average score difference is calculated by subtracting scores of males from scores of females. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.17.—Averages on the reflecting on texts reading literacy subscale by gender with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Female		Male		Female		Male			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	48	2.2	53	2.2	548	4.7	507	4.0	42	5.5
Austria	52	2.4	48	2.4	532	3.8	493	3.5	39	5.5
Belgium	48	1.7	52	1.7	522	5.3	475	5.2	47	6.4
Canada	50	0.5	50	0.5	566	1.7	521	1.8	45	1.7
Czech Republic	52	1.8	48	1.8	511	2.6	457	4.3	54	4.7
Denmark	50	0.9	50	0.9	523	3.3	480	3.2	43	3.6
Finland	51	0.8	49	0.8	564	3.1	501	3.0	63	2.8
France	51	1.3	49	1.3	515	2.9	477	3.7	39	3.9
Germany	50	1.5	50	1.5	503	4.2	455	3.5	48	5.5
Greece	50	1.3	50	1.3	522	5.4	468	6.8	54	6.1
Hungary	50	2.1	50	2.1	503	4.5	460	5.7	43	5.8
Iceland	50	0.8	50	0.8	529	1.9	476	2.0	54	2.8
Ireland	50	1.8	50	1.8	552	3.3	515	4.0	37	4.3
Italy	49	2.7	51	2.7	507	3.8	460	5.5	47	7.6
Japan	51	2.4	49	2.4	551	5.5	508	7.2	42	7.0
Korea, Republic of	44	3.5	56	3.5	504	5.8	451	6.4	53	7.4
Luxembourg	50	0.9	50	0.9	464	2.8	423	3.0	40	4.5
Mexico	50	1.2	50	1.2	463	4.5	428	4.9	35	5.6
New Zealand	50	2.4	50	2.4	559	3.9	502	4.2	57	6.4
Norway	49	0.9	51	0.9	539	2.9	479	4.0	60	4.1
Poland	49	2.6	51	2.6	504	5.8	451	6.4	53	7.4
Portugal	52	0.9	48	0.9	497	4.5	461	5.1	36	3.8
Spain	51	1.3	49	1.3	526	2.9	487	3.5	39	3.5
Sweden	49	0.9	51	0.9	536	2.5	486	2.7	51	2.6
Switzerland	50	1.0	50	1.0	511	5.1	465	5.4	46	4.5
United Kingdom	50	1.3	50	1.3	557	3.4	522	3.0	35	4.4
United States	52	1.0	48	1.0	524	6.3	488	8.4	36	4.5
OECD average	50	0.3	50	0.3	525	0.8	480	0.8	45	1.0
Non-OECD countries										
Brazil	54	1.2	46	1.2	429	3.7	404	4.2	25	4.3
Latvia	51	1.6	49	1.6	493	6.1	423	5.7	71	4.7
Liechtenstein	50	2.9	50	2.9	492	8.6	447	8.9	45	13.3
Russian Federation	50	0.9	50	0.9	480	4.0	431	4.2	49	2.8

NOTE: Average score difference is calculated by subtracting scores of males from scores of females. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.18.—Mathematics literacy averages by gender with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Female		Male		Female		Male			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	46	2.2	54	2.2	527	5.1	539	4.1	12	6.2
Austria	52	2.5	48	2.5	503	3.7	530	4.0	27	5.9
Belgium	48	1.6	52	1.6	518	5.2	524	4.6	6	6.1
Canada	50	0.7	50	0.7	529	1.6	539	1.8	10	1.9
Czech Republic	51	1.8	49	1.8	492	3.0	504	4.4	12	5.2
Denmark	49	1.2	51	1.2	507	3.0	522	3.1	15	3.7
Finland	52	1.1	48	1.1	536	2.6	537	2.8	1	3.3
France	52	1.4	48	1.4	511	2.8	525	4.1	14	4.2
Germany	51	1.6	49	1.6	483	4.0	498	3.1	15	5.1
Greece	50	1.6	50	1.6	444	5.4	451	7.7	7	7.4
Hungary	49	2.2	51	2.2	485	4.9	492	5.2	7	6.2
Iceland	50	1.1	50	1.1	518	2.9	513	3.1	5	4.0
Ireland	51	1.8	49	1.8	497	3.4	510	4.0	13	5.1
Italy	50	2.8	50	2.8	454	3.8	462	5.3	8	7.3
Japan	50	2.4	50	2.4	553	5.9	561	7.3	8	7.4
Korea, Republic of	44	3.6	56	3.6	532	5.1	559	4.6	27	7.8
Luxembourg	49	1.2	51	1.2	439	3.2	454	3.0	15	4.7
Mexico	50	1.3	50	1.3	382	3.8	393	4.5	11	4.9
New Zealand	49	2.4	51	2.4	539	4.1	536	5.0	3	6.7
Norway	50	1.1	50	1.1	495	2.9	506	3.8	11	4.0
Poland	49	2.9	51	2.9	468	6.3	472	7.5	5	8.5
Portugal	52	1.1	48	1.1	446	4.7	464	4.7	19	4.9
Spain	51	2.0	49	2.0	469	3.3	487	4.3	18	4.5
Sweden	50	1.2	50	1.2	507	3.0	514	3.2	7	4.0
Switzerland	50	1.2	50	1.2	523	4.8	537	5.3	14	5.0
United Kingdom	50	1.5	50	1.5	526	3.7	534	3.5	8	5.0
United States	51	1.3	49	1.3	490	7.3	497	8.9	7	5.4
OECD average	50	0.4	50	0.4	495	0.9	506	1.0	11	1.2
Non-OECD countries										
Brazil	53	1.5	47	1.5	322	4.7	349	4.7	27	5.6
Latvia	51	1.9	49	1.9	460	5.6	467	5.3	6	5.8
Liechtenstein	51	3.6	49	3.6	510	11.1	521	11.5	12	17.7
Russian Federation	49	1.1	51	1.1	479	6.2	478	5.7	2	4.8

NOTE: Gender difference is calculated by subtracting average scores of males from average scores of females. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.19.—Science literacy averages by gender with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Female		Male		Female		Male			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	49	2.1	51	2.1	529	4.8	526	3.9	3	5.3
Austria	52	2.5	48	2.5	514	4.3	526	3.8	12	6.3
Belgium	48	1.7	52	1.7	498	5.6	496	5.2	2	6.7
Canada	50	0.6	50	0.6	531	1.7	529	1.9	2	1.9
Czech Republic	51	1.8	49	1.8	511	3.2	512	3.8	1	5.1
Denmark	50	1.2	50	1.2	476	3.5	488	3.9	12	4.8
Finland	50	1.0	50	1.0	541	2.7	534	3.5	6	3.8
France	52	1.4	48	1.4	498	3.8	504	4.2	6	4.8
Germany	49	1.7	51	1.7	487	3.4	489	3.4	3	4.7
Greece	49	1.4	51	1.4	464	5.2	457	6.1	7	5.7
Hungary	50	2.2	50	2.2	497	5.0	496	5.8	2	6.9
Iceland	50	1.1	50	1.1	499	3.0	495	3.4	5	4.7
Ireland	50	1.9	50	1.9	517	4.2	511	4.2	6	5.5
Italy	50	2.7	50	2.7	483	3.9	474	5.6	9	7.7
Japan	51	2.3	49	2.3	554	5.9	547	7.2	7	7.2
Korea, Republic of	44	3.5	56	3.5	541	5.1	561	4.3	19	7.6
Luxembourg	50	1.1	50	1.1	448	3.2	441	3.6	7	5.0
Mexico	50	1.3	50	1.3	419	3.9	423	4.2	4	4.8
New Zealand	49	2.7	51	2.7	535	3.8	523	4.6	12	7.0
Norway	47	1.3	53	1.3	505	3.3	499	4.1	7	5.0
Poland	49	2.8	51	2.8	480	6.5	486	6.1	6	7.4
Portugal	51	1.3	49	1.3	462	4.2	456	4.8	6	4.3
Spain	51	1.1	49	1.1	491	3.6	492	3.5	1	4.0
Sweden	50	1.0	50	1.0	513	2.9	512	3.5	#	3.9
Switzerland	51	1.2	49	1.2	493	4.7	500	5.7	7	5.4
United Kingdom	51	1.4	49	1.4	531	4.0	535	3.4	4	5.2
United States	51	1.2	49	1.2	502	6.5	497	8.9	5	5.3
OECD average	50	0.4	50	0.4	501	0.8	501	0.9	#	1.0
Non-OECD countries										
Brazil	54	1.6	46	1.6	376	3.8	376	4.8	#	5.6
Latvia	53	1.8	47	1.8	472	5.8	449	6.4	23	5.4
Liechtenstein	47	3.9	53	3.9	468	9.3	484	10.9	16	14.7
Russian Federation	51	1.0	49	1.0	467	5.2	453	5.4	14	4.5

#Too small to report.

NOTE: Gender difference is calculated by subtracting average scores of males from average scores of females. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.20.—Combined reading literacy averages by parents' education with standard errors, by country: 2000

	PERCENT OF STUDENTS						**AVERAGES**					
	Less than high school		**High school**		**College**		**Less than high school**		**High school**		**College**	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Australia	31	1.3	25	0.8	44	1.4	498	3.7	521	3.6	559	4.4
Austria	62	0.9	9	0.5	29	0.9	495	2.5	533	6.4	536	3.5
Belgium	20	0.8	35	0.8	46	0.9	450	4.7	540	3.0	519	4.0
Canada	8	0.3	27	0.4	65	0.5	482	2.8	522	2.1	549	1.6
Czech Republic	33	1.0	43	0.7	24	0.9	450	4.1	502	2.5	538	4.1
Denmark	28	1.0	21	0.7	51	1.0	457	4.0	491	3.3	528	2.6
Finland	50	1.1	14	0.5	36	1.1	531	3.3	559	3.9	566	3.2
France	41	1.3	15	0.6	44	1.1	484	3.5	530	3.3	523	2.8
Germany	51	1.1	10	0.5	39	1.0	464	3.8	511	5.3	524	4.6
Greece	33	1.4	23	0.8	44	1.4	442	6.0	482	4.3	495	6.0
Hungary	37	1.4	35	1.1	28	1.4	433	4.3	495	3.9	529	5.5
Iceland	43	0.9	21	0.6	36	0.9	497	2.3	509	3.3	526	2.6
Ireland	30	1.2	31	0.9	39	1.3	505	3.8	530	3.7	544	4.2
Italy	44	1.0	35	0.8	21	0.9	465	4.0	502	3.4	515	4.5
Japan	—	—	—	—	—	—	—	—	—	—	—	—
Korea, Republic of	40	1.1	31	0.9	29	1.4	507	2.9	532	2.8	541	3.5
Luxembourg	48	0.9	20	0.8	31	0.7	418	3.0	469	4.0	479	3.6
Mexico	68	1.9	9	0.5	23	1.8	403	2.9	457	5.2	469	6.5
New Zealand	34	1.0	8	0.5	58	1.0	515	3.8	541	5.7	549	3.6
Norway	25	0.9	21	0.8	54	1.2	492	3.8	500	3.9	520	3.6
Poland	28	1.2	49	1.1	23	1.1	443	4.9	485	4.3	533	7.2
Portugal	64	1.6	15	0.7	21	1.3	456	4.2	482	6.3	514	6.8
Spain	52	1.6	20	0.8	27	1.6	473	3.0	510	3.1	525	2.8
Sweden	17	0.6	24	0.8	59	1.0	495	3.5	518	2.9	526	2.6
Switzerland	53	1.2	8	0.4	39	1.2	477	4.0	517	7.2	519	5.2
United Kingdom	41	1.0	8	0.4	51	1.0	500	3.0	558	5.6	547	3.1
United States	10	1.8	43	1.6	46	2.5	443	7.2	497	4.9	536	6.4
OECD average	38	0.2	23	0.2	39	0.3	471	0.9	508	0.8	530	0.8
Non-OECD countries												
Brazil	53	1.6	25	1.1	22	1.2	374	3.4	420	3.5	428	5.9
Latvia	9	0.8	47	1.5	44	1.4	403	8.6	458	5.4	473	6.4
Liechtenstein	61	2.9	#	#	32	2.9	476	6.5	#	#	509	8.7
Russian Federation	7	0.4	49	1.2	45	1.3	418	7.4	458	3.9	476	4.3

—Not available.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 26 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.21.—Mathematics literacy averages by parents' education with standard errors, by country: 2000

	PERCENT OF STUDENTS						**AVERAGES**					
	Less than high school		**High school**		**College**		**Less than high school**		**High school**		**College**	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Australia	31	1.5	25	1.0	45	1.6	501	4.3	524	4.9	564	4.3
Austria	62	1.2	9	0.7	29	1.1	501	2.9	543	6.8	543	4.5
Belgium	20	0.9	34	0.9	45	1.0	462	5.6	552	3.5	533	4.9
Canada	8	0.4	26	0.5	65	0.6	487	3.0	522	2.0	546	1.6
Czech Republic	33	1.2	44	1.0	23	1.0	455	3.8	504	3.3	549	5.0
Denmark	28	1.2	21	0.9	50	1.1	483	4.3	512	3.7	539	3.1
Finland	50	1.3	14	0.7	36	1.2	520	2.9	551	4.8	555	2.9
France	42	1.3	15	0.7	43	1.2	498	3.7	543	3.8	533	3.3
Germany	51	1.4	10	0.6	39	1.3	469	4.3	514	5.6	527	4.8
Greece	32	1.5	23	1.0	45	1.7	411	7.1	450	6.5	473	7.4
Hungary	37	1.3	35	1.3	28	1.5	436	4.3	502	4.0	544	6.3
Iceland	44	1.2	21	0.8	35	1.2	506	3.5	517	4.1	533	3.9
Ireland	30	1.3	30	1.3	40	1.5	479	3.2	510	3.7	520	3.8
Italy	44	1.2	35	1.0	21	1.1	439	4.1	470	4.0	481	4.9
Japan	—	—	—	—	—	—	—	—	—	—	—	—
Korea, Republic of	40	1.3	31	1.1	29	1.5	525	3.3	551	3.6	573	4.4
Luxembourg	50	1.2	20	1.0	30	1.1	429	3.2	468	5.0	478	5.1
Mexico	67	1.9	10	0.8	23	1.8	369	3.2	420	6.2	432	6.4
New Zealand	33	1.3	8	0.6	59	1.4	522	4.9	543	7.8	559	3.5
Norway	27	1.1	20	0.8	53	1.5	491	5.3	493	4.2	511	3.8
Poland	29	1.3	49	1.4	23	1.2	438	5.8	475	5.9	529	7.3
Portugal	64	1.8	15	0.9	21	1.5	442	3.8	455	7.2	495	6.8
Spain	53	1.7	20	1.1	27	1.6	456	3.3	492	5.4	510	3.8
Sweden	18	0.7	23	0.9	59	1.1	489	4.9	516	4.1	518	3.4
Switzerland	53	1.5	9	0.5	38	1.6	512	4.5	548	9.0	556	5.5
United Kingdom	42	1.1	9	0.5	50	1.2	507	3.3	561	7.4	552	3.4
United States	10	1.8	43	2.0	46	2.6	428	8.3	484	5.2	527	7.5
OECD average	38	0.3	23	0.2	39	0.3	469	0.9	505	1.1	529	1.0
Non-OECD countries												
Brazil	52	1.8	24	1.2	23	1.3	307	3.7	360	5.0	373	8.4
Latvia	9	1.0	47	1.4	44	1.6	417	12.8	462	4.6	477	6.1
Liechtenstein	59	3.8	#	#	34	3.6	503	9.5	#	#	544	13.2
Russian Federation	7	0.5	48	1.4	46	1.5	442	9.9	472	6.2	494	5.5

—Not available.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 26 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.22.—Science literacy averages by parents' education with standard errors, by country: 2000

	PERCENT OF STUDENTS						AVERAGES					
	Less than high school		High school		College		Less than high school		High school		College	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Australia	33	1.5	25	1.1	43	1.5	501	3.9	522	4.1	554	4.6
Austria	64	1.2	8	0.6	28	1.2	508	3.3	537	6.8	546	4.1
Belgium	20	0.9	35	1.0	46	1.1	441	5.5	523	3.7	510	4.6
Canada	9	0.3	27	0.6	65	0.6	482	3.4	516	2.2	544	1.7
Czech Republic	34	1.1	43	0.9	23	1.0	475	3.9	518	2.6	560	5.1
Denmark	28	1.2	21	0.9	51	1.2	438	4.8	474	4.6	513	3.5
Finland	50	1.1	14	0.7	35	1.1	523	3.0	546	5.3	558	4.4
France	41	1.4	14	0.8	46	1.3	473	4.5	527	5.7	524	3.9
Germany	51	1.3	10	0.7	38	1.2	465	3.5	513	6.6	528	3.7
Greece	34	1.5	22	1.0	43	1.4	432	5.7	467	4.8	481	6.4
Hungary	36	1.5	36	1.3	28	1.4	444	5.2	509	4.4	552	6.4
Iceland	43	1.3	20	1.0	37	1.3	482	3.2	498	5.1	515	3.8
Ireland	30	1.4	31	1.1	39	1.4	488	4.1	513	4.0	535	4.7
Italy	43	1.2	35	1.1	22	1.0	454	4.6	494	4.1	502	5.0
Japan	—	—	—	—	—	—	—	—	—	—	—	—
Korea, Republic of	40	1.3	31	1.1	29	1.6	532	3.2	559	3.5	573	4.8
Luxembourg	48	1.3	21	1.1	32	1.2	424	3.5	463	5.6	480	5.0
Mexico	68	2.0	9	0.7	23	2.0	406	2.8	445	5.5	462	6.9
New Zealand	34	1.3	8	0.7	57	1.3	507	4.0	545	7.2	548	3.5
Norway	24	1.0	21	1.2	55	1.6	478	5.1	498	4.9	517	3.3
Poland	27	1.4	48	1.5	25	1.5	444	6.1	489	5.3	530	8.0
Portugal	65	1.7	14	1.0	20	1.4	446	3.8	479	7.3	494	7.2
Spain	53	1.8	20	1.0	27	1.8	468	3.5	514	4.3	526	4.0
Sweden	16	0.8	25	0.9	59	1.3	492	4.5	507	4.4	523	3.1
Switzerland	52	1.4	9	0.5	40	1.4	472	4.5	519	8.3	526	5.7
United Kingdom	41	1.3	8	0.5	51	1.2	511	3.7	570	7.5	553	3.2
United States	11	1.9	44	1.5	46	2.4	438	10.2	488	5.9	534	7.2
OECD average	38	0.3	23	0.2	39	0.3	470	0.9	507	1.0	528	1.0
Non-OECD countries												
Brazil	53	1.7	24	1.2	23	1.3	353	3.7	394	5.0	413	6.8
Latvia	9	1.0	48	1.7	44	1.7	397	9.4	459	5.7	478	7.1
Liechtenstein	60	4.1	#	#	35	3.9	463	8.6	#	#	500	13.7
Russian Federation	6	0.5	49	1.3	45	1.3	422	9.5	452	4.7	477	5.6

—Not available.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 26 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.23.—Relationship between parents' socioeconomic status and combined reading literacy, mathematics literacy, and science literacy scores with standard errors, by country: 2000

	AVERAGE SCORE POINT INCREASE WITH A ONE UNIT INCREASE ON THE ISEI INDEX					
	Combined reading literacy		**Mathematics literacy**		**Science literacy**	
Country	Slope	s.e.	Slope	s.e.	Slope	s.e.
Australia	1.9	0.1	1.8	0.1	1.6	0.1
Austria	2.2	0.1	1.9	0.2	2.1	0.2
Belgium	2.3	0.1	2.3	0.2	2.5	0.2
Canada	1.6	0.1	1.3	0.1	1.4	0.1
Czech Republic	2.7	0.1	2.6	0.1	2.6	0.1
Denmark	1.8	0.1	1.5	0.1	2.0	0.2
Finland	1.3	0.1	1.2	0.1	1.1	0.1
France	1.9	0.1	1.6	0.1	2.1	0.1
Germany	2.8	0.1	2.4	0.2	2.5	0.2
Greece	1.7	0.2	1.9	0.2	1.6	0.2
Hungary	2.4	0.1	2.6	0.2	2.7	0.2
Iceland	1.2	0.1	1.0	0.1	0.8	0.1
Ireland	1.9	0.1	1.6	0.1	1.8	0.1
Italy	1.6	0.1	1.3	0.2	1.5	0.1
Japan	0.4	0.2	0.6	0.2	0.5	0.2
Korea, Republic of	0.9	0.1	1.3	0.1	1.2	0.2
Luxembourg	2.4	0.1	2.0	0.1	2.0	0.2
Mexico	1.9	0.1	1.8	0.2	1.6	0.2
New Zealand	2.0	0.1	1.9	0.2	1.9	0.2
Norway	1.8	0.1	1.6	0.1	1.6	0.2
Poland	2.2	0.2	2.2	0.2	2.0	0.2
Portugal	2.4	0.1	2.1	0.1	2.0	0.1
Spain	1.6	0.1	1.7	0.1	1.9	0.1
Sweden	1.7	0.1	1.9	0.1	1.5	0.1
Switzerland	2.5	0.1	2.1	0.1	2.5	0.2
United Kingdom	2.4	0.1	2.1	0.1	2.3	0.1
United States	2.1	0.2	2.2	0.2	2.1	0.2
OECD average	2.1	#	2.0	#	2.0	#
Non-OECD countries						
Brazil	1.6	0.1	2.0	0.2	1.6	0.2
Latvia	1.3	0.1	0.9	0.1	1.2	0.2
Liechtenstein	2.0	0.3	1.4	0.5	2.2	0.5
Russian Federation	1.6	0.1	1.5	0.1	1.5	0.1

#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.24.—Combined reading literacy averages by parents' national origin with standard errors, by country: 2000

	PERCENT OF STUDENTS						AVERAGES					
	Both native		**Native and foreign**		**Both foreign**		**Both native**		**Native and foreign**		**Both foreign**	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Australia	58	1.6	19	0.9	23	1.8	529	4.0	541	5.1	521	6.7
Austria	84	1.1	6	0.5	10	0.9	516	2.4	509	6.6	434	6.4
Belgium	76	1.3	12	0.6	12	1.1	526	4.0	496	5.9	417	7.6
Canada	69	1.1	11	0.3	21	1.0	536	1.5	551	3.5	526	3.1
Czech Republic	92	0.4	7	0.4	1	0.1	501	2.2	506	5.1	465	15.4
Denmark	87	0.7	7	0.4	6	0.6	504	2.1	501	8.4	424	7.2
Finland	97	0.3	2	0.2	1	0.2	548	2.6	540	8.6	477	13.6
France	75	1.1	13	0.6	12	0.9	513	2.7	505	5.1	464	6.3
Germany	78	0.9	6	0.4	15	0.8	509	2.3	492	6.3	424	6.2
Greece	89	1.1	6	0.6	5	0.9	477	4.6	492	11.0	414	16.4
Hungary	96	0.3	2	0.2	2	0.2	481	4.0	495	11.3	486	11.1
Iceland	94	0.5	5	0.5	#	#	509	1.6	504	7.8	#	#
Ireland	88	0.7	9	0.6	2	0.3	527	3.2	531	6.0	549	11.1
Italy	95	0.3	4	0.3	1	0.2	488	2.9	501	6.5	450	13.3
Japan	99	0.1	#	#	#	#	525	5.0	#	#	#	#
Korea, Republic of	—	—	—	—	—	—	—	—	—	—	—	—
Luxembourg	51	0.8	15	0.6	34	0.7	480	1.9	455	4.0	385	3.6
Mexico	95	0.4	2	0.2	4	0.4	427	3.3	404	10.7	344	8.1
New Zealand	63	1.1	17	0.6	20	1.1	535	2.9	549	4.6	508	7.0
Norway	89	0.6	6	0.4	5	0.4	510	2.7	512	7.1	453	6.6
Poland	98	0.3	2	0.3	#	#	482	4.4	468	19.8	#	#
Portugal	90	0.5	7	0.4	3	0.3	470	4.5	494	9.1	457	12.4
Spain	94	0.5	4	0.3	2	0.4	495	2.6	475	9.5	457	13.1
Sweden	79	1.0	11	0.6	10	0.9	524	2.2	520	4.8	465	5.2
Switzerland	64	1.1	16	0.7	21	0.9	515	3.8	511	6.9	427	4.8
United Kingdom	82	1.5	9	0.6	9	1.2	527	2.5	547	7.8	494	9.4
United States	81	2.7	6	0.7	14	2.1	512	6.2	494	12.3	472	14.1
OECD average	83	0.2	8	0.1	9	0.2	505	0.7	512	1.3	456	2.1
Non-OECD countries												
Brazil	99	0.2	1	0.2	#	#	398	3.0	403	14.8	#	#
Latvia	60	2.8	18	0.9	22	2.4	464	6.5	460	6.6	454	6.3
Liechtenstein	55	2.9	25	2.6	20	2.0	506	5.6	486	11.0	422	13.7
Russian Federation	87	0.8	9	0.4	4	0.6	462	4.2	471	7.4	455	6.4

—Not available.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 26 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.25.—Mathematics literacy averages by parents' national origin with standard errors, by country: 2000

	Percent of students						**Averages**					
	Both native		**Native and foreign**		**Both foreign**		**Both native**		**Native and foreign**		**Both foreign**	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Australia	57	1.7	19	1.3	24	1.9	532	4.3	547	5.2	530	6.9
Austria	84	1.2	7	0.6	9	0.9	523	2.7	516	7.2	442	8.5
Belgium	77	1.4	11	0.8	12	1.2	541	4.4	506	7.0	422	8.3
Canada	69	1.1	11	0.3	21	1.1	537	1.5	536	3.4	526	3.2
Czech Republic	92	0.6	7	0.5	1	0.2	505	2.8	503	7.6	476	19.5
Denmark	86	0.8	8	0.6	6	0.6	522	2.2	506	7.8	447	8.5
Finland	97	0.4	2	0.3	1	0.2	537	2.2	544	10.1	487	25.0
France	76	1.3	13	0.8	11	0.9	527	2.7	511	6.3	479	6.9
Germany	78	1.1	6	0.4	16	0.9	512	2.5	480	8.9	427	7.5
Greece	90	1.1	6	0.6	5	0.8	452	5.5	458	14.7	364	16.3
Hungary	96	0.4	2	0.3	2	0.3	489	4.1	506	15.9	493	18.3
Iceland	94	0.6	5	0.6	#	#	516	2.3	515	11.1	#	#
Ireland	89	0.7	9	0.7	2	0.3	502	2.8	513	6.9	542	18.5
Italy	95	0.5	4	0.4	1	0.3	458	2.9	480	8.3	409	21.3
Japan	100	0.1	#	#	#	#	560	5.5	#	#	#	#
Korea, Republic of	—	—	—	—	—	—	—	—	—	—	—	—
Luxembourg	50	0.9	14	0.7	36	0.9	476	2.7	462	5.3	404	3.9
Mexico	95	0.5	2	0.3	3	0.3	392	3.4	343	14.3	317	10.7
New Zealand	62	1.2	18	0.8	20	1.2	542	3.3	545	6.2	528	7.8
Norway	89	0.7	6	0.5	5	0.5	503	2.8	508	8.3	448	9.8
Poland	98	0.4	1	0.3	#	#	474	5.1	468	25.0	#	#
Portugal	91	0.6	7	0.6	3	0.3	454	4.0	477	9.9	439	15.9
Spain	94	0.5	4	0.4	2	0.4	478	3.0	471	11.4	455	16.9
Sweden	79	1.1	10	0.7	11	1.1	519	2.5	509	6.3	454	7.5
Switzerland	64	1.1	16	0.8	20	1.1	550	4.2	541	6.7	463	5.6
United Kingdom	82	1.5	9	0.7	9	1.2	534	2.4	546	7.6	497	10.8
United States	81	2.7	6	0.7	13	2.3	501	7.3	484	11.4	461	13.6
OECD average	83	0.2	8	0.1	9	0.2	503	0.7	512	1.7	464	2.4
Non-OECD countries												
Brazil	99	0.3	1	0.2	#	#	336	3.8	362	20.4	#	#
Latvia	60	3.1	18	1.2	22	2.5	470	6.8	456	7.3	464	7.7
Liechtenstein	55	3.7	24	3.2	21	3.0	540	9.2	499	17.2	474	17.9
Russian Federation	86	0.9	9	0.6	5	0.7	481	5.8	482	9.9	468	10.9

—Not available.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 26 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.26.—Science literacy averages by parents' national origin with standard errors, by country: 2000

	PERCENT OF STUDENTS						AVERAGES					
	Both native		**Native and foreign**		**Both foreign**		**Both native**		**Native and foreign**		**Both foreign**	
Country	Percent	s.e.	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Australia	58	1.6	20	1.3	22	1.9	530	4.1	535	5.7	519	7.7
Austria	84	1.2	7	0.5	10	1.0	529	2.5	516	8.6	439	8.1
Belgium	76	1.3	12	0.7	12	1.1	516	4.8	483	8.0	407	7.7
Canada	70	1.1	10	0.3	20	1.1	535	1.6	539	3.8	513	3.2
Czech Republic	92	0.6	7	0.5	1	0.2	518	2.4	521	7.1	501	23.1
Denmark	87	0.9	7	0.6	6	0.6	488	2.5	485	11.2	405	9.9
Finland	97	0.4	2	0.3	1	0.2	539	2.5	540	11.8	470	18.1
France	75	1.4	13	0.9	12	1.0	512	3.3	497	7.9	443	7.5
Germany	79	1.1	6	0.5	15	0.9	509	2.4	486	9.5	414	6.7
Greece	89	1.0	6	0.7	5	0.7	464	4.8	469	10.9	398	17.5
Hungary	96	0.5	2	0.3	2	0.3	498	4.2	524	14.1	472	14.8
Iceland	94	0.6	6	0.6	#	#	497	2.2	488	10.0	#	#
Ireland	88	0.8	9	0.7	3	0.4	512	3.3	533	8.1	555	11.8
Italy	95	0.5	4	0.4	1	0.2	478	2.9	499	10.4	481	25.6
Japan	99	0.1	#	#	#	#	554	5.3	#	#	#	#
Korea, Republic of	—	—	—	—	—	—	—	—	—	—	—	—
Luxembourg	53	1.3	14	0.9	33	1.2	478	2.8	456	6.3	391	4.6
Mexico	94	0.5	2	0.3	4	0.4	425	3.2	421	16.3	364	9.0
New Zealand	63	1.3	17	0.8	20	1.2	533	2.9	546	5.1	509	6.7
Norway	88	0.7	6	0.5	5	0.5	507	2.8	497	8.9	440	8.4
Poland	98	0.4	2	0.3	#	#	486	5.1	461	22.5	#	#
Portugal	90	0.7	7	0.6	3	0.4	460	4.1	474	10.4	430	11.7
Spain	94	0.6	4	0.5	2	0.5	494	3.0	473	11.3	442	19.2
Sweden	79	1.1	11	0.7	10	1.0	519	2.8	514	6.8	460	6.2
Switzerland	63	1.2	17	0.8	20	1.0	516	4.4	507	7.0	428	6.1
United Kingdom	82	1.6	9	0.7	9	1.3	537	2.6	552	9.9	501	11.2
United States	80	2.9	6	0.8	14	2.2	507	6.5	488	14.1	467	17.7
OECD average	83	0.2	8	0.1	9	0.2	504	0.7	507	1.7	453	2.2
Non-OECD countries												
Brazil	99	0.3	1	0.3	#	#	376	3.2	399	24.0	#	#
Latvia	60	2.9	18	1.0	22	2.6	468	6.4	465	7.4	451	7.5
Liechtenstein	55	4.0	25	3.4	20	2.9	503	8.9	470	14.4	420	17.6
Russian Federation	87	0.9	9	0.5	4	0.7	460	4.8	466	8.3	462	10.4

—Not available.
#Too small to report.

NOTE: Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 26 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.27.—Combined reading literacy averages by language spoken at home with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Test language		Other language		Test language		Other language			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	83	1.6	17	1.6	535	3.6	504	7.5	31	7.4
Austria	93	0.7	7	0.7	515	2.4	434	7.2	81	7.6
Belgium	77	1.0	23	1.0	516	3.9	500	4.7	15	5.6
Canada	69	0.5	31	0.5	541	1.8	527	2.4	14	2.8
Czech Republic	99	0.2	1	0.2	494	2.2	432	39.6	62	39.0
Denmark	93	0.4	7	0.4	503	2.2	425	8.1	78	7.7
Finland	94	0.3	6	0.3	549	2.6	502	10.2	47	10.3
France	95	0.5	5	0.5	510	2.6	446	7.5	64	7.7
Germany	92	0.8	8	0.8	500	2.9	386	13.9	114	15.5
Greece	97	0.6	3	0.6	477	4.8	407	18.3	69	17.6
Hungary	—	—	—	—	—	—	—	—	—	—
Iceland	98	0.3	2	0.3	509	1.5	463	13.4	46	13.5
Ireland	98	0.5	2	0.5	527	3.1	537	18.0	9	17.1
Italy	82	1.1	18	1.1	500	2.9	448	6.8	52	7.0
Japan	100	0.1	#	#	525	5.2	#	#	†	†
Korea, Republic of	—	—	—	—	—	—	—	—	—	—
Luxembourg	71	0.6	29	0.6	467	1.6	382	3.4	86	3.8
Mexico	98	0.5	2	0.5	423	3.4	352	12.9	71	13.2
New Zealand	90	0.6	10	0.6	542	2.6	467	9.1	75	8.6
Norway	94	0.5	6	0.5	512	2.8	444	7.8	68	7.5
Poland	99	0.2	1	0.2	483	4.4	417	23.6	65	23.1
Portugal	98	0.2	2	0.2	471	4.6	416	13.8	56	14.7
Spain	85	1.5	15	1.5	495	2.8	493	5.9	2	6.1
Sweden	93	0.6	7	0.6	523	2.0	459	6.6	64	6.8
Switzerland	81	0.8	19	0.8	512	4.1	427	5.6	85	4.7
United Kingdom	96	0.7	4	0.7	528	2.5	470	12.8	57	12.7
United States	89	2.4	11	2.4	514	5.8	438	13.1	76	11.4
OECD average	91	0.2	9	0.2	507	0.6	452	2.1	55	2.1
Non-OECD countries										
Brazil	99	0.2	1	0.2	397	3.0	388	28.2	9	27.5
Latvia	91	0.5	9	0.5	510	2.6	457	8.4	28	12.7
Liechtenstein	73	2.4	27	2.4	500	5.4	438	11.7	62	13.8
Russian Federation	93	2.1	7	2.1	465	4.3	432	9.3	33	10.5

—Not available.
#Too small to report.
†Not applicable.

NOTE: Average score difference is calculated by subtracting the average score for those who speak other languages at home from average scores for those who speak the test language at home in each country. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 25 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.28.—Mathematics literacy averages by language spoken at home with standard errors, by country: 2000

	PERCENT OF STUDENTS				AVERAGES				DIFFERENCE	
	Test language		Other language		Test language		Other language			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	82	1.7	18	1.7	537	3.6	522	6.8	15	6.8
Austria	93	0.7	7	0.7	523	2.5	443	9.2	80	9.6
Belgium	78	1.0	22	1.0	529	4.1	514	5.2	15	6.0
Canada	69	0.6	31	0.6	531	1.6	543	2.4	11	2.9
Czech Republic	99	0.2	1	0.2	499	2.7	476	36.0	23	35.4
Denmark	93	0.5	7	0.5	520	2.4	446	8.7	74	8.7
Finland	94	0.4	6	0.4	538	2.2	511	9.7	27	9.9
France	95	0.6	5	0.6	522	2.7	466	8.4	56	8.4
Germany	93	0.7	7	0.7	505	2.6	395	11.4	110	12.4
Greece	97	0.6	3	0.6	451	5.6	371	17.4	80	18.2
Hungary	—	—	—	—	—	—	—	—	—	—
Iceland	98	0.3	2	0.3	516	2.2	481	15.8	35	15.9
Ireland	98	0.7	2	0.7	503	2.7	528	15.7	25	15.3
Italy	81	1.2	19	1.2	466	3.5	434	6.1	32	7.1
Japan	100	0.1	#	#	559	5.5	#	#	†	†
Korea, Republic of	—	—	—	—	—	—	—	—	—	—
Luxembourg	70	0.9	30	0.9	467	2.4	402	4.4	65	5.0
Mexico	98	0.5	2	0.5	389	3.5	314	15.3	75	15.8
New Zealand	89	0.9	11	0.9	546	3.2	509	9.4	37	9.2
Norway	94	0.5	6	0.5	505	2.9	447	9.5	57	9.5
Poland	99	0.3	1	0.3	474	5.1	425	30.1	49	29.5
Portugal	98	0.3	2	0.3	455	4.0	424	21.1	31	21.6
Spain	86	1.5	14	1.5	475	3.1	493	6.7	18	6.8
Sweden	93	0.7	7	0.7	517	2.3	449	10.1	68	10.4
Switzerland	80	0.9	20	0.9	546	4.3	467	6.7	79	6.0
United Kingdom	96	0.7	4	0.7	534	2.5	476	14.1	57	14.1
United States	89	2.8	11	2.8	503	6.7	430	11.3	73	10.0
OECD average	91	0.2	9	0.2	504	0.7	463	2.3	41	2.4
Non-OECD countries										
Brazil	99	0.3	1	0.3	335	3.7	305	24.6	30	24.8
Latvia	93	0.8	7	0.8	466	4.6	450	12.5	21	13.4
Liechtenstein	74	3.4	26	3.4	529	8.8	475	15.6	54	19.6
Russian Federation	93	2.1	7	2.1	480	5.8	465	14.9	15	16.0

—Not available.
#Too small to report.
†Not applicable.

NOTE: Average score difference is calculated by subtracting the average score for those who speak other languages at home from average scores for those who speak the test language at home in each country. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 25 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.29.—Science literacy averages by language spoken at home with standard errors, by country: 2000

	Percent of students				**Averages**				**Difference**	
	Test language		**Other language**		**Test language**		**Other language**			
Country	Percent	s.e.	Percent	s.e.	Average	s.e.	Average	s.e.	Absolute value	s.e.
Australia	83	1.7	17	1.7	535	3.2	496	9.3	39	9.0
Austria	93	0.9	7	0.9	527	2.4	439	9.7	88	10.1
Belgium	77	1.1	23	1.1	506	4.8	486	5.7	20	6.5
Canada	70	0.6	30	0.6	532	1.9	529	2.8	2	3.5
Czech Republic	99	0.2	1	0.2	513	2.4	488	34.3	24	33.8
Denmark	93	0.6	7	0.6	488	2.7	405	11.5	83	11.3
Finland	94	0.3	6	0.3	540	2.5	495	8.4	46	8.4
France	95	0.6	5	0.6	507	3.1	437	10.2	70	10.7
Germany	92	0.8	8	0.8	504	2.6	390	10.3	113	11.3
Greece	97	0.8	3	0.8	464	4.6	379	20.8	85	20.2
Hungary	—	—	—	—	—	—	—	—	—	—
Iceland	98	0.3	2	0.3	497	2.2	471	21.5	26	21.7
Ireland	98	0.5	2	0.5	514	3.2	493	21.0	21	20.8
Italy	83	1.2	17	1.2	490	2.8	437	7.6	53	7.7
Japan	100	0.1	#	#	553	5.5	#	#	†	†
Korea, Republic of	—	—	—	—	—	—	—	—	—	—
Luxembourg	72	1.1	28	1.1	467	2.4	388	4.6	79	5.3
Mexico	98	0.4	2	0.4	422	3.3	368	11.0	54	11.4
New Zealand	90	0.8	10	0.8	541	2.5	470	9.0	71	9.3
Norway	93	0.5	7	0.5	507	2.9	442	9.1	65	9.5
Poland	99	0.3	1	0.3	486	5.2	429	22.1	57	22.5
Portugal	98	0.3	2	0.3	461	4.0	385	15.4	76	15.2
Spain	85	1.5	15	1.5	491	2.9	500	7.2	9	7.3
Sweden	92	0.7	8	0.7	519	2.5	455	8.5	64	8.6
Switzerland	80	0.9	20	0.9	513	4.4	429	5.7	85	5.0
United Kingdom	96	0.8	4	0.8	536	2.6	481	16.4	56	16.7
United States	89	2.4	11	2.4	509	6.2	440	16.0	68	13.7
OECD average	91	0.2	9	0.2	505	0.7	449	2.2	56	2.3
Non-OECD countries										
Brazil	99	0.2	1	0.2	376	3.3	373	33.1	3	33.0
Latvia	93	1.0	7	1.0	464	5.4	438	16.2	26	15.3
Liechtenstein	73	3.3	27	3.3	493	7.9	430	14.8	63	16.8
Russian Federation	93	2.2	7	2.2	462	5.1	437	10.2	26	11.0

—Not available.
#Too small to report.
†Not applicable.

NOTE: Average score difference is calculated by subtracting the average score for those who speak other languages at home from average scores for those who speak the test language at home in each country. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 25 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.30.—Reading, mathematics and science literacy averages of U.S. 15-year-olds by race/ethnicity with standard errors: 2000

	READING LITERACY								MATHEMATICS LITERACY		SCIENCE LITERACY	
	Combined reading literacy		Retrieving information		Interpreting texts		Reflecting on texts					
Subpopulation	Average	s.e.	Average	s.e.	Average	s.e.	Average	s.e.	Average	s.e.	Average	s.e.
Black students	445	8.0	437	8.3	446	7.8	449	8.1	423	8.8	435	8.6
Hispanic students	449	7.8	440	7.8	450	7.7	453	8.5	437	6.3	438	7.8
Other students*	504	14.5	497	14.1	504	14.9	507	15.4	495	14.5	510	18.5
White students	538	5.1	537	5.3	539	5.3	539	5.4	530	5.5	535	5.8

*The other group comprises students identifying themselves as American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander, or multiracial.

NOTE: s.e. means standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), unpublished tabulations, 2000.

Table A3.31.—Percentage of 15-year-olds who agree or strongly agree that reading is a favorite hobby by gender with standard errors, by country: 2000

	STUDENTS WHO AGREE OR STRONGLY AGREE THAT READING IS A FAVORITE HOBBY						**Gender difference**	
Country	Total percent	s.e.	Percent female	s.e.	Percent male	s.e.	Absolute value	s.e.
Australia	31	1.1	41	1.5	23	1.2	18	1.7
Austria	30	1.2	43	1.5	17	1.0	26	1.8
Belgium	26	0.8	35	1.0	19	1.0	16	1.4
Canada	34	0.5	45	0.6	23	0.5	22	0.7
Czech Republic	52	0.9	68	1.0	33	1.1	36	1.4
Denmark	31	0.7	41	1.2	21	0.9	20	1.6
Finland	41	0.9	60	1.2	21	1.0	39	1.4
France	33	0.8	42	1.0	22	0.9	20	1.3
Germany	29	0.7	41	1.0	17	0.9	24	1.3
Greece	37	1.0	43	1.2	31	1.3	12	1.5
Hungary	29	0.9	38	1.2	21	1.0	17	1.5
Iceland	27	0.8	35	1.0	19	1.1	17	1.4
Ireland	36	1.0	48	1.2	23	1.2	25	1.5
Italy	45	1.0	56	1.2	34	1.1	22	1.7
Japan	36	1.0	41	1.3	32	1.1	8	1.6
Korea, Republic of	35	0.9	37	1.5	33	1.2	4	2.0
Luxembourg	31	0.8	42	1.2	21	1.2	21	1.7
Mexico	62	1.3	68	1.3	55	1.6	12	1.5
New Zealand	33	0.9	42	1.1	25	1.1	17	1.5
Norway	24	0.8	33	1.4	16	0.8	17	1.6
Poland	39	1.1	47	1.3	30	1.3	17	1.7
Portugal	54	0.9	69	1.1	38	1.2	31	1.7
Spain	35	0.9	44	1.3	26	1.0	19	1.6
Sweden	29	0.7	39	1.1	20	0.9	20	1.5
Switzerland	35	1.1	49	1.4	21	1.2	28	1.5
United Kingdom	30	1.0	39	1.4	20	0.9	18	1.6
United States	30	1.0	37	1.1	22	1.2	15	1.5
OECD average	35	0.2	45	0.3	25	0.2	20	0.3
Non-OECD countries								
Brazil	49	1.1	58	1.3	38	1.3	19	1.6
Latvia	37	1.0	49	1.6	26	1.3	23	2.2
Liechtenstein	31	2.4	44	3.8	18	3.1	26	5.2
Russian Federation	43	1.1	50	1.3	35	1.2	15	1.4

NOTE: Gender difference is calculated by subtracting percentage of males who agree from percentage of females who agree. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 27 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.32.—Percentage of 15-year-olds who report memorizing often or always when studying by gender with standard errors, by country: 2000

STUDENTS WHO REPORT MEMORIZING OFTEN OR ALWAYS WHEN STUDYING

							Gender difference	
Country	Total percent	s.e.	Percent female	s.e.	Percent male	s.e.	Absolute value	s.e.
Australia	47	0.9	45	1.3	49	1.1	3	1.7
Austria	45	0.9	40	1.2	50	1.3	10	1.7
Belgium	37	0.9	32	1.1	41	1.1	9	1.5
Canada	—	—	—	—	—	—	—	—
Czech Republic	47	0.8	44	1.1	50	1.1	6	1.6
Denmark	41	0.9	38	1.3	43	1.3	5	1.9
Finland	41	0.9	38	1.1	44	1.3	7	1.7
France	—	—	—	—	—	—	—	—
Germany	46	0.9	44	1.2	49	1.2	5	1.7
Greece	—	—	—	—	—	—	—	—
Hungary	52	0.9	48	1.2	55	1.3	7	1.7
Iceland	40	0.9	39	1.2	43	1.2	4	1.7
Ireland	43	0.9	45	1.2	42	1.4	3	2.0
Italy	45	0.8	44	1.1	47	1.2	3	1.7
Japan	—	—	—	—	—	—	—	—
Korea, Republic of	37	1.2	37	1.7	37	1.5	#	2.3
Luxembourg	33	0.9	33	1.2	33	1.2	#	1.6
Mexico	51	1.0	52	1.3	50	1.3	2	1.6
New Zealand	48	0.9	48	1.3	49	1.3	2	1.8
Norway	40	0.8	35	1.2	45	1.3	11	1.9
Poland	—	—	—	—	—	—	—	—
Portugal	43	0.8	41	1.1	46	1.4	4	1.8
Spain	—	—	—	—	—	—	—	—
Sweden	42	0.7	35	1.1	48	1.0	13	1.6
Switzerland	46	1.1	45	1.3	48	1.5	3	1.7
United Kingdom	52	1.2	50	1.5	54	1.8	4	2.5
United States	49	1.1	50	1.4	48	1.8	2	2.4
OECD average	44	0.2	42	0.3	46	0.3	4	0.5
Non-OECD countries								
Brazil	57	1.0	57	1.4	57	1.3	#	1.8
Latvia	44	1.0	43	1.5	46	1.4	3	2.0
Liechtenstein	42	2.7	41	4.3	44	4.0	4	6.2
Russian Federation	37	1.0	34	1.1	40	1.3	7	1.3

#Too small to report.

NOTE: Gender difference is calculated by subtracting percentage of males who agree from percentage of females who agree. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 21 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Table A3.33.—Percentage of 15-year-olds who report using an elaboration strategy often or always when studying by gender with standard errors, by country: 2000

	STUDENTS WHO REPORT USING AN ELABORATION STRATEGY OFTEN OR ALWAYS WHEN STUDYING							
							Gender difference	
Country	Total percent	s.e.	Percent female	s.e.	Percent male	s.e.	Absolute value	s.e.
Australia	69	0.8	71	1.1	67	1.1	4	1.5
Austria	36	0.9	38	1.3	34	1.1	4	1.6
Belgium	47	1.0	48	1.6	46	1.2	1	1.9
Canada	—	—	—	—	—	—	—	—
Czech Republic	42	0.9	46	1.2	38	1.1	8	1.7
Denmark	59	0.8	55	1.2	62	0.9	7	1.4
Finland	39	0.8	41	1.0	38	1.3	3	1.5
France	—	—	—	—	—	—	—	—
Germany	42	0.8	46	1.1	38	1.3	8	1.7
Greece	—	—	—	—	—	—	—	—
Hungary	90	0.7	92	0.8	88	0.9	4	1.1
Iceland	56	0.8	56	1.2	55	1.1	1	1.7
Ireland	66	0.9	69	1.0	64	1.4	5	1.7
Italy	15	0.6	13	0.7	17	0.9	4	1.1
Japan	—	—	—	—	—	—	—	—
Korea, Republic of	47	0.8	44	1.1	48	1.0	4	1.4
Luxembourg	40	0.8	45	1.2	37	1.0	8	1.6
Mexico	46	1.0	45	1.3	48	1.5	3	2.0
New Zealand	68	0.9	70	1.3	66	1.2	4	1.7
Norway	33	0.8	27	1.2	40	1.0	14	1.6
Poland	—	—	—	—	—	—	—	—
Portugal	44	0.8	42	1.2	46	1.0	4	1.5
Spain	—	—	—	—	—	—	—	—
Sweden	61	0.8	58	1.2	64	1.2	6	1.9
Switzerland	44	1.1	45	1.3	43	1.5	3	1.7
United Kingdom	77	1.0	77	1.4	78	1.0	#	1.5
United States	59	0.8	61	1.2	57	1.5	4	2.2
OECD average	50	0.2	51	0.3	50	0.3	1	0.5
Non-OECD countries								
Brazil	72	1.0	73	1.2	71	1.2	2	1.6
Latvia	58	1.0	60	1.4	56	1.3	4	1.7
Liechtenstein	34	2.8	33	3.6	35	4.0	1	5.3
Russian Federation	48	0.9	49	1.3	47	1.1	2	1.6

#Too small to report.

NOTE: Gender difference is calculated by subtracting percentage of males who agree from percentage of females who agree. Detail may not sum to totals due to rounding. Although the Netherlands participated in the Program for International Student Assessment (PISA) in 2000, technical problems with its sample prevent its results from being discussed here. For information on the results for the Netherlands, see OECD (2001). The OECD average is the average of the national averages of 21 OECD countries. Because PISA is principally an OECD study, the results for non-OECD countries are displayed separately from those of the OECD countries and not included in the OECD average. s.e. means standard error.

SOURCE: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000.

Appendix

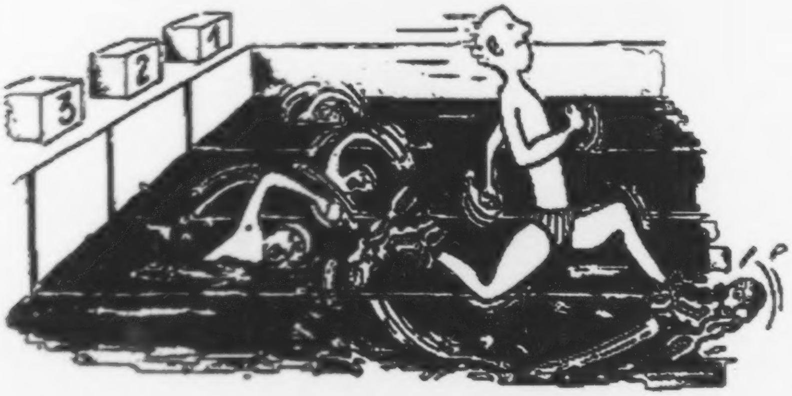
4

PISA 2000 RELEASED ITEMS

Selected Sample Items

These PISA sample items illustrate a range of questions across the three PISA domains—reading, mathematics and science literacy. Reading literacy proficiency is described by 5 levels, which represent increasing ability to solve problems in a real-life context as one moves from level 1 to 5. PISA will develop similar levels for mathematics and science literacy when each is the major content area (mathematics in 2003 and science in 2006). In addition, for reading literacy information is provided on specific reading processes or aspects such as retrieving information, interpreting texts, and reflecting on texts. Each sample item displayed for reading literacy describes its level and which specific reading process or aspect it assesses.

FEEL GOOD IN YOUR RUNNERS



For 14 years the Sports Medicine Center of Lyon (France) has been studying the injuries of young sports players and sports professionals. The study has established that the best course is prevention … and good shoes.

Knocks, falls, wear and tear…

Eighteen percent of sports players aged 8 to 12 already have heel injuries. The cartilage of a soccer player's ankle does not respond well to shocks, and 25% of professionals have discovered for themselves that it is an especially weak point. The cartilage of the delicate knee joint can also be irreparably damaged and if care is not taken right from childhood (10–12 years of age), this can cause premature osteoarthritis. The hip does not escape damage either and, particularly when tired, players run the risk of fractures as a result of falls or collisions.

According to the study, soccer players who have been playing for more than ten years have bony outgrowths either on the tibia or on the heel. This is what is known as "soccer player's foot", a deformity caused by shoes with soles and ankle parts that are too flexible.

Protect, support, stabilize, absorb

If a shoe is too rigid, it restricts movement. If it is too flexible, it increases the risk of injuries and sprains. A good sports shoe should meet four criteria:

Firstly, it must *provide exterior protection:* resisting knocks from the ball or another player, coping with unevenness in the ground, and keeping the foot warm and dry even when it is freezing cold and raining.

It must *support the foot*, and in particular the ankle joint, to avoid sprains, swelling and other problems, which may even affect the knee.

It must also provide players with good *stability* so that they do not slip on a wet ground or skid on a surface that is too dry.

Finally, it must *absorb shocks*, especially those suffered by volleyball and basketball players who are constantly jumping.

Dry feet

To avoid minor but painful conditions such as blisters or even splits or athlete's foot (fungal infections), the shoe must allow evaporation of perspiration and must prevent outside dampness from getting in. The ideal material for this is leather, which can be waterproofed to prevent the shoe from getting soaked the first time it rains.

Use the article on the opposite page to answer the questions below.

RELEASED QUESTION 26: RUNNERS

Aspect: Interpreting texts
Level: 1
Text format: Continuous
Situation: Educational

What does the author intend to show in this text?

A That the quality of many sports shoes has greatly improved.
B That it is best not to play soccer if you are under 12 years of age.
C That young people are suffering more and more injuries due to their poor physical condition.
D That it is very important for young sports players to wear good sports shoes.

The correct answer is D.

United States percent full credit (s.e.)	78 (2.2)
OECD percent full credit (s.e.)	87 (0.2)

NOTE: s.e. means standard error.

RELEASED QUESTION 28: RUNNERS

Aspect: Retrieving information
Level: 1
Text format: Continuous
Situation: Educational

One part of the article says, "A good sports shoe should meet four criteria."

What are these criteria?

To receive full credit, students must refer to the four criteria in italics in the text.

United States percent full credit (s.e.)	84 (1.5)
OECD percent full credit (s.e.)	80 (0.2)

NOTE: s.e. means standard error.

RELEASED QUESTION 29: RUNNERS

Aspect: Reflecting on texts
Level: 1
Text format: Continuous
Situation: Educational

Look at this sentence from near the end of the article. It is presented here in two parts:

"To avoid minor but painful conditions such as blisters or even splits or athlete's foot (fungal infections),..." *(first part)*

"...the shoe must allow evaporation of perspiration and must prevent outside dampness from getting in." *(second part)*

What is the relationship between the first and second parts of the sentence?

The second part

A contradicts the first part.
B repeats the first part.
C illustrates the problem described in the first part.
D gives the solution to the problem described in the first part.

The correct answer is D.

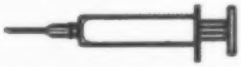
United States percent full credit (s.e.) 78 (1.5)
OECD percent full credit (s.e.) 79 (0.2)

NOTE: s.e. means standard error.

ACOL VOLUNTARY FLU IMMUNIZATION PROGRAM

As you are no doubt aware the flu can strike rapidly and extensively during winter. It can leave its victims ill for weeks.

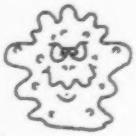
The best way to fight the virus is to have a fit and healthy body. Daily exercise and a diet including plenty of fruits and vegetables are highly recommended to assist the immune system to fight this invading virus.



ACOL has decided to offer staff the opportunity to be immunized against the flu as an additional way to prevent this insidious virus from spreading amongst us. ACOL has arranged for a nurse to administer the immunizations at ACOL, during a half-day session in work hours in the week of October 17. This program is free and available to all members of staff.

Participation is voluntary. Staff exercising the option will be asked to sign a consent form indicating that they do not have any allergies, and that they understand they may experience minor side effects.

Medical advice indicates that the immunization does not produce influenza. However, it may cause some side effects such as fatigue, mild fever and tenderness of the arm.



WHO SHOULD BE IMMUNIZED?

Anyone interested in being protected against the virus.

This immunization is especially recommended for people over the age of 65. But regardless of age, ANYONE who has a chronic debilitating disease, especially cardiac, pulmonary, bronchial or diabetic conditions.

In an office environment ALL staff are at risk of catching the flu.

WHO SHOULD NOT BE IMMUNIZED?

Individuals hypersensitive to eggs, people suffering from an acute feverish illness and pregnant women.

Check with your doctor if you are taking any medication or have had a previous reaction to a flu injection.

◆

If you would like to be immunized in the week of October 17 please advise the personnel officer, Anne Washington, by Friday October 7. The date and time will be set according to the availability of the nurse, the number of participants and the time convenient for most staff. If you would like to be immunized for this winter but cannot attend at the arranged time please let Anne know. An alternative session may be arranged if there are sufficient numbers.

For further information please contact Anne on ext. 5577.

Anne Washington, the personnel officer at a company called ACOL, prepared the information sheet on the previous page for ACOL staff. Refer to the information sheet to answer the questions which follow.

RELEASED QUESTION 6: FLU

Aspect: Retrieving information
Level: 2
Text format: Continuous
Situation: Occupational

Which one of the following describes a feature of the ACOL flu immunization program?

A Daily exercise classes will be run during the winter.
B Immunizations will be given during working hours.
C A small bonus will be offered to participants.
D A doctor will give the shots.

The correct answer is B.

United States percent full credit (s.e.)	71 (2.9)
OECD percent full credit (s.e.)	73 (0.3)

NOTE: s.e. means standard error.

RELEASED QUESTION 7: FLU

Aspect: Reflecting on texts
Level: 3 (full credit) 3 (partial credit)
Text format: Continuous
Situation: Occupational

We can talk about the **content** of a piece of writing (what it says).

We can talk about its **style** (the way it is presented).

Anne wanted the **style** of this information sheet to be friendly and encouraging.

Do you think she succeeded?

Explain your answer by referring in detail to the layout, style of writing, pictures or other graphics.

....

....

....

To receive full credit, responses must refer accurately to the text and relate style to purpose, consistent with "friendly and encouraging." The answer must do at least one of the following: 1) refer to one of the features in detail and/or 2) use evaluative terms other than "friendly and encouraging." Opinion about whether Anne succeeded may be stated or implied.

Responses that refer accurately to the text and relate purpose to information and content (rather than style), consistent with "friendly and encouraging," receive partial credit. Opinion about whether Anne succeeded may be stated or implied.

United States percent full credit (s.e.)	37 (2.7)
OECD percent full credit (s.e.)	48 (0.4)
United States percent partial credit (s.e.)	16 (1.8)
OECD percent partial credit (s.e.)	17 (0.3)

NOTE: s.e. means standard error.

RELEASED QUESTION 8: FLU

Aspect: Interpreting texts
Level: 3
Text format: Continuous
Situation: Occupational

This information sheet suggests that if you want to protect yourself against the flu virus, a flu shot is

A more effective than exercise and a healthy diet, but more risky.
B a good idea, but not a substitute for exercise and a healthy diet.
C as effective as exercise and a healthy diet, and less troublesome.
D not worth considering if you have plenty of exercise and a healthy diet.

The correct answer is B.

United States percent full credit (s.e.)	70 (2.4)
OECD percent full credit (s.e.)	56 (0.3)

NOTE: s.e. means standard error.

RELEASED QUESTION 9: FLU

Aspect: Reflecting on texts
Level: 4
Text format: Continuous
Situation: Occupational

Part of the information sheet says:

> **WHO SHOULD BE IMMUNIZED?**
>
> Anyone interested in being protected against the virus.

After Anne had circulated the information sheet, a colleague told her that she should have left out the words "Anyone interested in being protected against the virus" because they were misleading.

Do you agree that these words are misleading and should have been left out?

Explain your answer.

....

....

....

....

To receive full credit, responses should evaluate the section of text in relation to the term "misleading" by indicating that there is a contradiction. This contradiction may or may not be explained and agreement or disagreement may be stated or implied.

Full credit can also be gained by evaluating the section of text in relation to the term "misleading" by indicating that the statement may be an exaggeration. This exaggeration may or may not be explained and agreement or disagreement may be stated or implied.

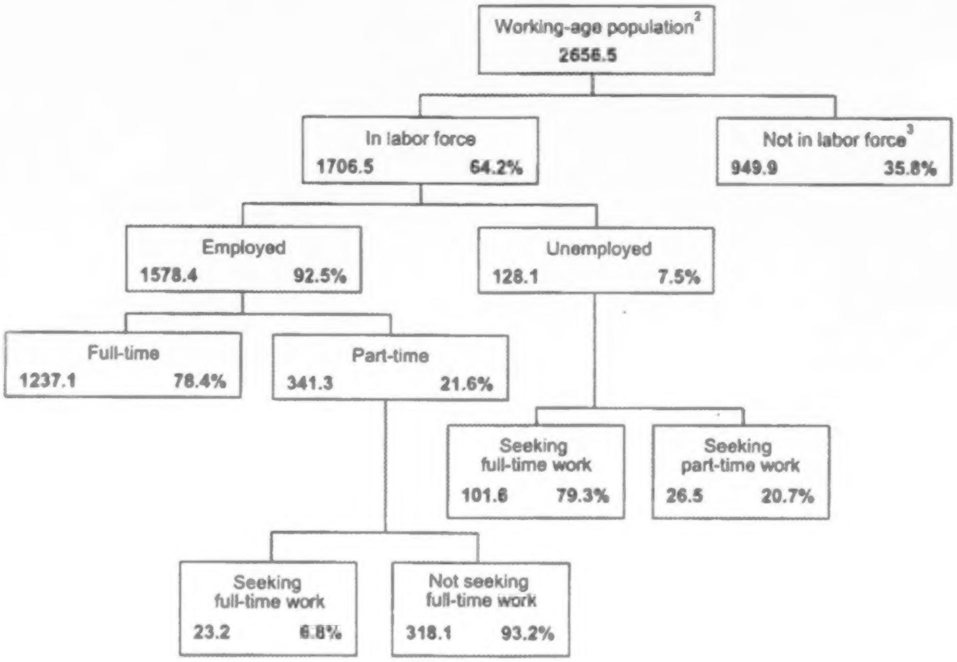
United States percent full credit (s.e.)	41 (2.8)
OECD percent full credit (s.e.)	35 (0.3)

NOTE: s.e. means standard error.

LABOR

The tree diagram below shows the structure of a country's labor force or "working-age population". The total population of the country in 1995 was about 3.4 million.

The Labor Force Structure year ended March 31, 1995 (000s)[1]



Notes

1. Numbers of people are given in thousands (000s).
2. The working-age population is defined as people between the ages of 15 and 65.
3. People "Not in labor force" are those not actively seeking work and/or not available for work.

Use the information about a country's labor force on the opposite page to answer the questions below.

RELEASED QUESTION 16: LABOR

Aspect: Retrieving information
Level: 4 (full credit) 3 (partial credit)
Text format: Non-continuous
Situation: Educational

How many people of working age were not in the labor force? (Write the **number** of people, not the percentage.)

....

To receive full credit, responses should indicate that the number in the tree diagram and the "000s" in the title/footnote have been integrated to produce the number 949,000. Approximations between 949,000 and 950,000, in numbers or words, were accepted. In addition, 900,000 or one million (in words or numbers) were accepted if accompanied by a qualifier such as "almost" or "about."

Correctly indicating the number in the tree diagram, but failing to integrate the "000s" in the title/footnote can achieve partial credit. In this situation, students would answer 949.9 in words or numbers.

United States percent full credit (s.e.)	24 (2.1)
OECD percent full credit (s.e.)	31 (0.4)
United States percent partial credit (s.e.)	54 (2.3)
OECD percent partial credit (s.e.)	41 (0.4)

NOTE: s.e. means standard error.

RELEASED QUESTION 17: LABOR

Aspect: Interpreting texts
Level: 5 (full credit) 2 (partial credit)
Text format: Non-continuous
Situation: Educational

In which part of the tree diagram, if any, would each of the people listed in the table below be included?

Show your answer by placing a cross in the correct box in the table.

The first one has been done for you.

	"In labor force: employed"	"In labor force: unemployed"	"Not in labor force"	Not included in any category
A part-time waiter, aged 35	☒	☐	☐	☐
A business woman, aged 43, who works a sixty-hour week	☐	☐	☐	☐
A full-time student, aged 21	☐	☐	☐	☐
A man, aged 28, who recently sold his shop and is looking for work	☐	☐	☐	☐
A woman, aged 55, who has never worked or wanted to work outside the home	☐	☐	☐	☐
A grandmother, aged 80, who still works a few hours a day at the family's store	☐	☐	☐	☐

On the following page is a correctly answered diagram.

	"In labor force: employed"	"In labor force: unemployed"	"Not in labor force"	Not included in any category
A part-time waiter, aged 35	☒	☐	☐	☐
A business woman, aged 43, who works a sixty-hour week	☒	☐	☐	☐
A full-time student, aged 21	☐	☐	☒	☐
A man, aged 28, who recently sold his shop and is looking for work	☐	☒	☐	☐
A woman, aged 55, who has never worked or wanted to work outside the home	☐	☐	☒	☐
A grandmother, aged 80, who still works a few hours a day at the family's store	☐	☐	☐	☒

To receive full credit, students needed to correctly identify each person's labor classification. Students who correctly identified 3 or 4 of the labor classifications received partial credit.

United States percent full credit (s.e.)	15 (1.9)
OECD percent full credit (s.e.)	14 (0.3)
United States percent partial credit (s.e.)	53 (2.7)
OECD percent partial credit (s.e.)	54 (0.3)

NOTE: s.e. means standard error.

AMANDA AND THE DUCHESS

Summary: Since Léocadia's death, the Prince, who was in love with her, has been inconsolable. At a shop called *Réséda Soeurs*, the Duchess, who is the Prince's aunt, has met a young shop assistant, Amanda, who looks amazingly like Léocadia. The Duchess wants Amanda to help her set the Prince free from the memories which haunt him.

A crossroads in the castle grounds, a circular bench around a small obelisk…evening is falling…

AMANDA
I still don't understand. What can I do for him, ma'am? I can't believe you could possibly have thought…And why me? I'm not particularly pretty. And even if someone were very pretty—who could suddenly come between him and his memories like that?

THE DUCHESS
No-one but you.

AMANDA, *sincerely surprised*
Me?

THE DUCHESS
The world is so foolish, my child. It sees only parades, gestures, badges of office…that must be why you have never been told. But my heart hasn't deceived me—I almost cried out at Réséda Soeurs the first time I saw you. To someone who knew more of her than just her public image, you are the living likeness of Léocadia. *A silence. The evening birds have now taken over from the afternoon birds. The grounds are filled with shadows and twittering.*

AMANDA, *very gently*
I really don't think I can, ma'am. I have nothing, I am nothing, and those lovers…that was my fancy, don't you see? *She has got up. As if about to leave, she has picked up her small suitcase.*

THE DUCHESS, *gently also, and very wearily*
Of course, my dear. I apologize.
She in turn gets up, with difficulty, like an old woman. A bicycle bell is heard in the evening air; she gives a start.
Listen…it's him! Just show yourself to him, leaning against this little obelisk where he first met her. Let him see you, even if it's just this once, let him call out, take a sudden interest in this likeness, in this stratagem which I shall confess to him tomorrow and for which he will hate me—in anything but this dead girl who'll take him away from me one of these days, I'm sure…(*She has taken her by the arm.*) You will do that, won't you? I beg you most humbly, young lady. (*She looks at her, beseechingly, and quickly adds:*) And then, that way, you'll see him too. And…I can feel that I'm blushing again from saying this to you—life is just too mad! That's the third time I've blushed in sixty years, and the second time in ten minutes—you'll see him; and if he could ever (why not him, since he's handsome and charming and he wouldn't be the first?) if he could ever have the good fortune, for himself and for me, to take your fancy for one moment…*The bell again in the shadows, but very close now.*

AMANDA, *in a whisper*
What should I say to him?

THE DUCHESS, *gripping her arm*
Simply say: "Excuse me, Sir, can you tell me the way to the sea?" *She has hurried into the deeper shadows of the trees. Just in time. There is a pale blur. It is the Prince on his bicycle. He passes very close to the pale blur of Amanda by the obelisk. She murmurs.*

AMANDA
Excuse me, Sir…
He stops, dismounts from the bicycle, takes off his hat and looks at her.

THE PRINCE
Yes?

AMANDA
Can you tell me the way to the sea?

THE PRINCE
Take the second turning on your left.
He bows, sadly and courteously, gets back on the bicycle and rides away. The bell is heard again in the distance. The Duchess comes out of the shadows, very much an old woman.

AMANDA, *gently, after a while*
He didn't recognize me…

THE DUCHESS
It was dark…And then, who knows what face he gives her now, in his dreams? (*She asks timidly:*) The last train has gone, young lady. In any case, wouldn't you like to stay at the castle tonight?

AMANDA, *in a strange voice*
Yes, ma'am. *It is completely dark. The two of them can no longer be seen in the shadows, and only the wind can be heard in the huge trees of the grounds.*

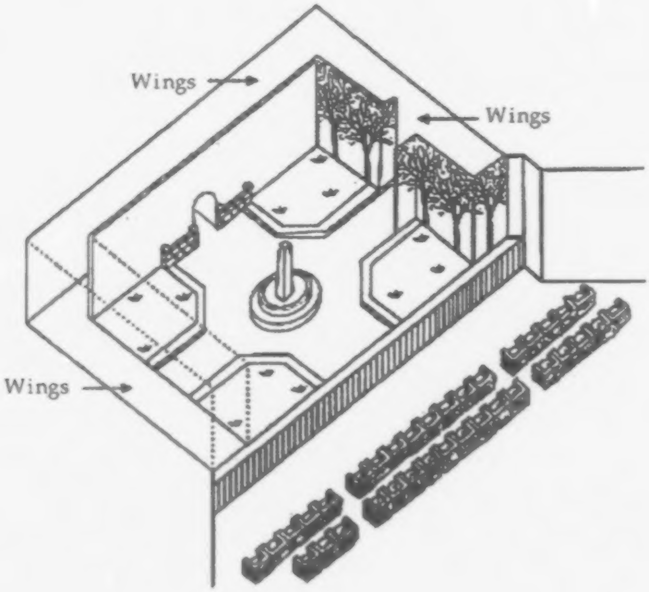
THE CURTAIN FALLS

RELEASED QUESTION 40: AMANDA AND THE DUCHESS

Aspect: Retrieving information
Level: 4
Text format: Continuous
Situation: Personal

The director positions the actors on the stage. On a diagram, the director represents Amanda with the letter A and the Duchess with the letter D.

Put an A and a D on the following diagram of the set to show approximately where Amanda and the Duchess are when the Prince arrives.



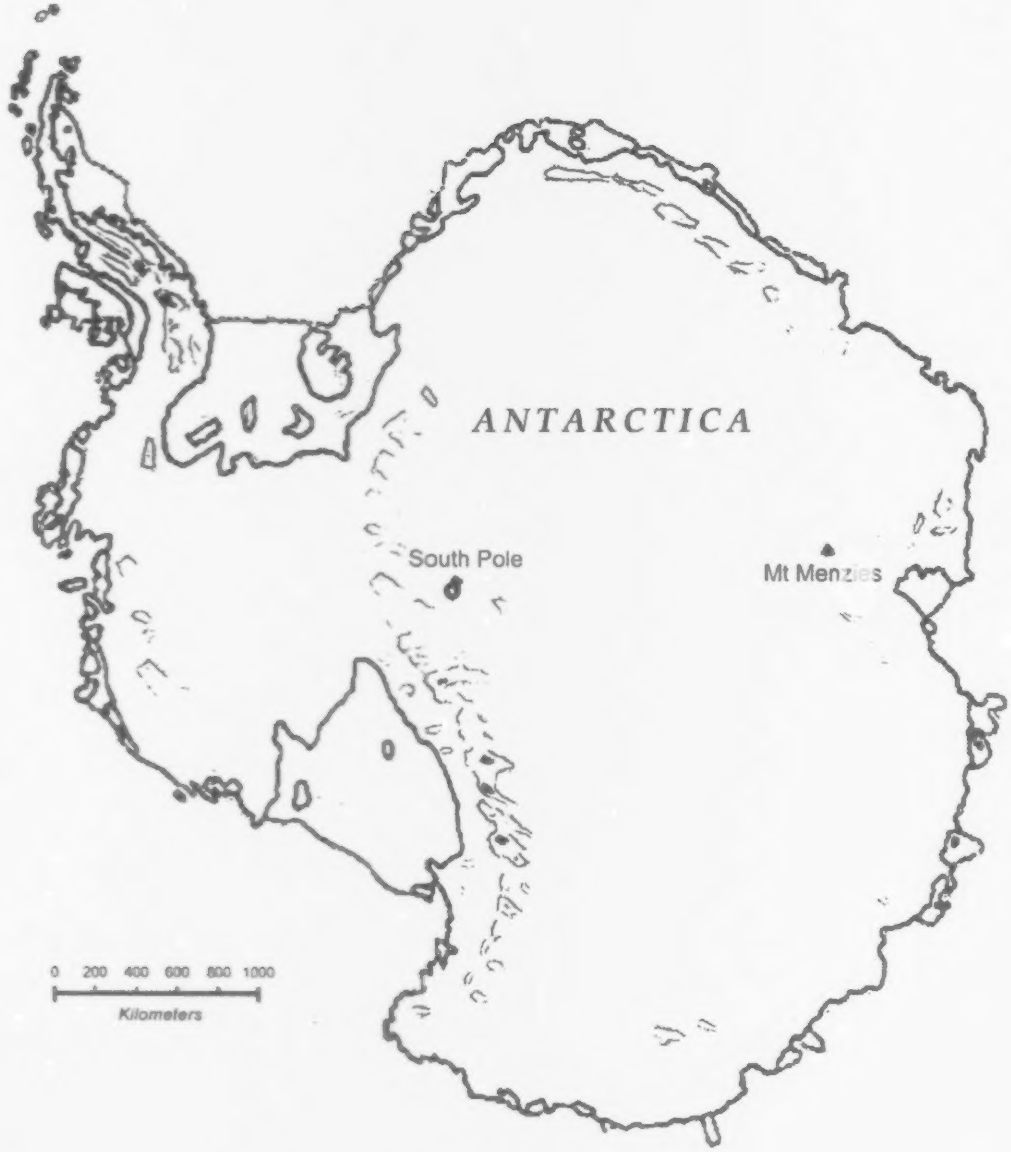
To receive full credit, the students must correctly mark an "A" by the obelisk and a "D" behind or near the trees.

United States percent full credit (s.e.) 38 (2.9)
OECD percent full credit (s.e.) 47 (0.4)

NOTE: s.e. means standard error.

CONTINENT AREA

Below is a map of Antarctica.



RELEASED QUESTION 4: CONTINENT AREA

Competency class 2: Connections and integration for problem solving
Overarching concept: Space and shape
Situation: Personal

Estimate the area of Antarctica using the map scale.

Show your work and explain how you made your estimate.
(You can draw over the map if it helps you with your estimation)

To receive full credit, students needed to provide the correct answer, between 12,000,000 square kilometers and 18,000,000 square kilometers (units not required), and could show evidence of using a correct method such as drawing a square or circle to estimate the answer. Students who provided the correct answer but did not show any work also received full credit.

Students who show evidence of using a correct method, but provided an incorrect answer, received partial credit.

United States percent full credit (s.e.)	10 (1.3)
OECD percent full credit (s.e.)	20 (0.3)
United States percent partial credit (s.e.)	38 (2.5)
OECD percent partial credit (s.e.)	40 (0.4)

NOTE: s.e. means standard error.

CHAPTER
1
2
3
4
5
A1
A2
A3
A4

TRIANGLES

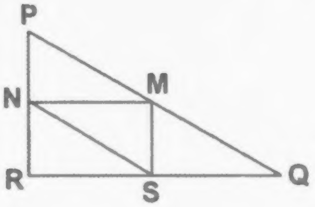
RELEASED QUESTION 9: TRIANGLES

Competency class 1: Reproduction, definitions and computations
Overarching concept: Space and shape
Situation: Scientific

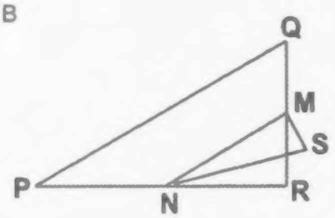
Circle the one figure below that fits the following description.

Triangle PQR is a right triangle with right angle at R. The segment RQ is less than the segment PR. M is the midpoint of the segment PQ and N is the midpoint of the segment QR. S is a point inside the triangle. The segment MN is greater than the segment MS.

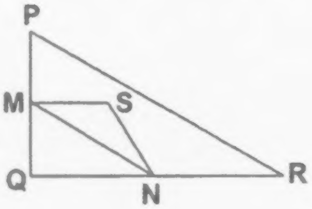
A



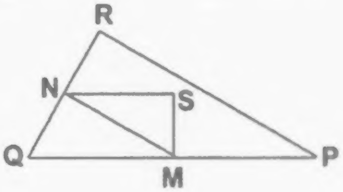
B



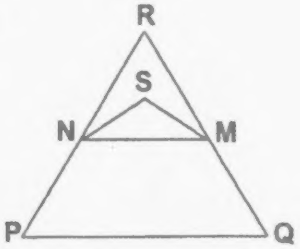
C



D



E



The correct answer is D.

United States percent full credit (s.e.)	46 (1.9)
OECD percent full credit (s.e.)	62 (0.3)

NOTE: s.e. means standard error.

OZONE

Read the following section of an article about the ozone layer.

The atmosphere is an ocean of air and a precious natural resource for sustaining life on the Earth. Unfortunately, human activities based on national/personal interests are causing harm to this common resource, notably by depleting the fragile ozone layer, which acts as a protective shield for life on the Earth.

Ozone molecules consist of three oxygen atoms, as opposed to oxygen molecules which consist of two oxygen atoms. Ozone molecules are exceedingly rare: fewer than ten in every million molecules of air. However, for nearly a billion years, their presence in the atmosphere has played a vital role in safeguarding life on Earth. Depending on where it is located, ozone can either protect or harm life on Earth. The ozone in the troposphere (up to 10 kilometers above the Earth's surface) is "bad" ozone which can damage lung tissues and plants. But about 90 percent of ozone found in the stratosphere (between 10 and 40 kilometers above the Earth's surface) is "good" ozone which plays a beneficial role by absorbing dangerous ultraviolet (UV-B) radiation from the Sun.

Without this beneficial ozone layer, humans would be more susceptible to certain diseases due to the increased incidence of ultra-violet rays from the Sun. In the last decades the amount of ozone has decreased. In 1974 it was hypothesized that chlorofluorocarbons (CFCs) could be a cause for this. Until 1987, scientific assessment of the cause-effect relationship was not convincing enough to implicate CFCs. However, in September 1987, diplomats from around the world met in Montreal (Canada) and agreed to set sharp limits to the use of CFCs.

RELEASED QUESTION 7: OZONE

Process: Apply scientific knowledge in situation presented
Area: Science in life and health (physiological change)
Situation: Global

Lines 14 and 15 state: "Without this beneficial ozone layer, humans would be more susceptible to certain diseases due to the increased incidence of ultra-violet rays from the Sun."

Name one of these specific diseases.

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To receive full credit, answers must refer to skin cancer or melanoma.

United States percent full credit (s.e.)	63 (2.5)
OECD percent full credit (s.e.)	63 (0.3)

NOTE: s.e. means standard error.

RELEASED QUESTION 8: OZONE

Process: Recognizing questions
Area: Science in Earth and environment (Earth/Space)
Situation: Global

At the end of the text, an international meeting in Montreal is mentioned. At that meeting lots of questions in relation to the possible depletion of the ozone layer were discussed. Two of those questions are given in the table below.

Can the questions listed below be answered by scientific research?

Circle Yes or No for each.

Question:	**Answerable by scientific research?**
Should the scientific uncertainties about the influence of CFCs on the ozone layer be a reason for governments to take no action?	Yes / No
What would the concentration of CFCs be in the atmosphere in the year 2002 if the release of CFCs into the atmosphere takes place at the same rate as it does now?	Yes / No

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To receive full credit, students must answer "no" to the first question and "yes" to the second question.

United States percent full credit (s.e.)	64 (2.1)
OECD percent full credit (s.e.)	59 (0.3)

NOTE: s.e. means standard error.

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